



Students from seventh to twelfth grade varied between working in small groups or, in some cases, as a class, to uncover answers and potential solutions to an array of environmental concerns. These ranged from unrecorded mercury pollution from a nearby petri-chemical plant in the soil of a school campus with a vegetable garden, to the high frequency of potholes in New Orleans and how this socioeconomically affected locals, to the estimated hundreds of pounds of plastic in a thirty-eight mile range along the Mississippi River, as hypothesized through a field trip day's worth of trawling along a half-mile stretch of the river's edge.

Students creatively and assertively developed their own research thesis, methods of data collection and formally summarized their data through both visual and written mediums of storytelling, as shown through some examples in this Community Science Forum. Thank you, youth Community Scientists of 2021!

INTRODUCTION

By Purl Feldman

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STUDENT-LED COMMUNITY SCIENCE PROJECTS

Students engage in community science principles to study soil, air, and water quality in Southern Louisiana.



HOUSEHOLD RECYCLING IN NEW ORLEANS

By Owen

My class was introduced to Public Lab back in late March. At first, I didn't think much of it, and I thought it would be just an easy A and a different change of flow from what we had been doing in class up until that point. Turns out, I am learning a lot about my city and about how us humans affect the environment. Our project consists of individual, group, and class assignments.

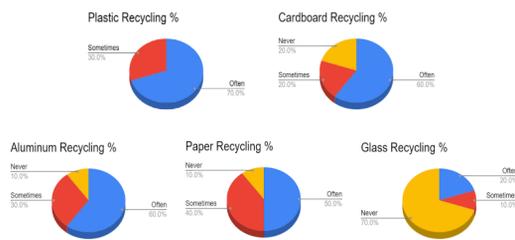
Our first task was an individual research assignment to find a topic that we could research that is local to New Orleans. I found an article about industrial pollution in a nearby parish, and I thought it was pretty interesting as I read through it. It explained how industrial pollution caused health issues and also environmental issues. The only problem with my topic was it was a little too far away and we needed something we could do at school and at home. Somebody found an article on "Gaps in Recycling" and most of the class voted for that issue when it was time to vote.

Our first assignment surrounding Gaps in Recycling was to create our issue brief template. This consisted of us naming our issue, summarizing it, and explaining the issues and obstacles around it. This made us do more research on the issue and at first it was slow. After about 15 minutes, everyone started to bounce ideas off each other and by the end of the 50-minute class period, we had our issue brief done.

Our next assignment was to find how other organizations in the world dealt with the same issue as us and how we could learn from what they did and maybe use their methods towards our data collection. I found a local company called Glass Half Full, located in the Greater New Orleans area. Local people give the company their leftover glass and they make many things, including sand for sandbags to protect the local area from flooding. I didn't really learn a method to use towards our data collecting but it made me think of something else. What if we count how many people in our area are recycling due to who has recycling bins?

Next, we had a class discussion on what everyone took out of the past assignment and how we will collect our data and we came up with two ways to collect data. One, to sort and count what we recycle at home and, two, interview people who recycle and find out what category of recyclables they recycle. I did data collecting and spent a lot of time

finding the gaps in recycling in my homes. At my mom's house, I found we recycle a lot more plastics than my dad does. I found 20 plastics containers and bottles, 10 aluminum cans and containers, and five cardboard boxes. At my dad's, I found 13 plastic bottles, no aluminum products, and eight cardboard boxes. In both homes, glass recycling is not offered by the city, so you have to go out of your way to local businesses that use glass people don't need. Next, I interviewed 10 of my close friends to find out how they recycle and what categories they recycle the most. These are the results:



With this information, I can come to the conclusion that plastic is the most recycled product and glass is the least recycled product. Because glass is the least recycled product, that is our gap in recycling in our city. To fill this gap, our city can start to provide curbside recycling for glass, along with the start-up of businesses and organizations that center around glass recycling. This project taught me a lot about my community, and it opened me up to what's actually happening to my city. Even if our city started curbside recycling for glass and even with the start-up of these businesses, it's going to be up to the people in the community to go out of their way to do what is needed to recycle their glass and also to recycle in general. The people who care should be the same people speaking up for what they believe in, and should be inspiring and motivating their neighbors to do the same.

COLLECTING MICROPLASTICS IN CITY PARK

By Kasey and Ashley

I believe community science is vital to any science course given during students' academic years for many reasons. First of all, the experience of working on a research project with fellow classmates and people in the community is very mind opening. Working one-on-one with other people allows you to see the situation from different perspectives and collaborate in order to find a solution to the problem at hand. Moreover, it is important to have community research projects in order for members of the community to come together and fix an ongoing problem that may

go unnoticed unless acted upon. In my opinion as a student, I believe that taking advantage of ongoing community science projects is essential for growing my perspective on different scientific issues in my community and growing my ability to work with others to accomplish a shared goal. Overall, I truly value the opportunity Public Lab is giving my class to do a research project because it will allow me to better my knowledge on the environment around me that I might take for granted.



Mrs. Merrill's Biology Class at Archbishop Chapelle High School created a plan to use the "BabyLegs" trawling apparatus to look for microplastics in the water in City Park. We used canoes to get to hard-to-reach areas. We also collected about 10 pounds of plastic and other litter. We plan to use our data to advocate for a reduction in plastic pollution in our community.

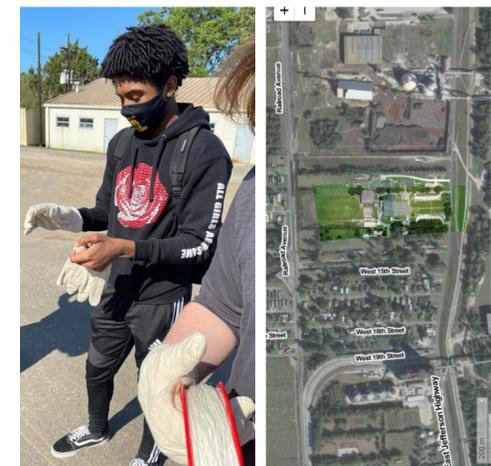


By Jeremiah

When we were first asked "What is a good issue that impacts our surrounding area and provides opportunities for research?" many ideas came to mind. We considered everything from pollution to railroads. But when someone mentioned potholes, we all recognized that it would be the best topic because of how many people it impacts. So we spent a lot of time researching the issue and surveying the community to better help understand how potholes affect the people of our city. The results from the map knitting we conducted and the surveys we gathered showed just how significantly potholes affect the community around us.

balloon to take pictures, but our current kite mapping has allowed us to get a good aerial view of our school and the surrounding area. This kite-mapping method could possibly allow us to spot potholes, but these flights taught us that we would need to take the pictures at a much lower altitude to get a detailed view of the road's surface. However, a potential downside of using multiple photos from a lower altitude still remains: it is very difficult to properly align the images and you will almost certainly have jagged edges where the images overlap. The process was a very enjoyable and beneficial experience overall; I am glad to have had the chance to collaborate with classmates and innovate potential solutions to our community's infrastructure problems.

I really enjoyed the whole process of discussing and actually performing our balloon mapping experiment. This was my first chance to ever experience something like this. All our flights and landings were successful in terms of the effectiveness of the equipment, mostly due to the near-perfect wind conditions. Eventually we were able to deploy the kite at high enough levels to get great pictures. In fact, the images were clear enough to better help us understand the environment around us from an aerial view. Although the project went well, there were a few things that ended up being a struggle. The process of bringing the kite back down was a pain, it caused a lot of stress and strain for just the four of us. Other than that, I enjoyed this whole process and would definitely consider participating in similar projects in the future.



By Robby

Recently, our class decided that we wanted to tackle an issue that affects our local community: potholes. Although balloon mapping is an effective method for observing potholes, we were unable to use this process due to a lack of helium, so we used a kite instead. We flew the kite three separate times with varying results, but all three launches and landings were successful due to the amount of wind and available personnel. We used a cheap point-and-shoot camera to take photos for our first flight, but we were not able to see the images clearly. We used an Arduino camera for the second flight. I mounted the camera and power bank onto a sheet of foam board, but we found that this design also had its flaws. The foam board caught a lot of wind and was very turbulent, which made nearly all the photos virtually unusable.

"The process allowed us to gain a different point of view, literally. We now have a better understanding of where there are high concentrations of potholes on our surrounding roads." - Torron

The final flight, however, was much more successful. We had changed the camera's housing by placing the camera inside the top half of a split two-liter bottle. By attaching a plastic tail on the back of the bottle half, we were able to prevent the camera from being so affected by the wind. Therefore, the camera remained facing down throughout the flight, and the pictures came out great. Next time I would like to use a helium

CALCULATING A TRASH ESTIMATE IN THE MISSISSIPPI RIVER THROUGH NEW ORLEANS

By Chad, John, and Zachary

We are students at Brother Martin High School in New Orleans, Louisiana, and we have been looking into a problem that has occurred over our entire lifetimes, which is pollution in the Mississippi River. People over the years have tried to take on pollution problems in the Mississippi River, but have been somewhat unsuccessful. Plastic pollution will never be completely cured, but we are going to hopefully find ways to remove the plastic without hurting the environment ourselves. We are also going to come up with a statistic based on the weight of trash per square mile to show just how much plastic there truly is.

Mississippi River. This can be a huge problem because the Mississippi River is a dangerous place, even on the shore. The river is home to many dangerous wildlife and plants. Some of this wildlife includes alligators, black widows, rattlesnakes, wild boar — the list could go on forever! Some dangerous plants include poison ivy, poison oak, and cicuta maculata. The way we will get around most of these is we will try to keep a good distance from the river and use tools to try to grab waste from the river and the banks.

Other groups are working on the pollution in Louisiana such as the U.S. Environmental Protection Agency and Environment America.

Wildlife and people who inhabit the Mississippi River area have been greatly affected by the amounts of plastic in the river. Fish and other water-dwelling animals have been dying and being pushed along the river because plastic kills them. If we can help remove plastic/trash from the Mississippi River, then we can know that we helped save these creatures.

We chose Caernarvon, LA as our location to collect trash. We would never have thought there would be that much plastic in one small part of the Mississippi River. All trash seen was collected within just under a quarter-mile stretch near the river. We ended up with 27.5 pounds of plastic and seven pounds of other trash including slippers, beer cans, and shoes. Most of the trash and plastic were collected with two lacrosse sticks, clamping them together to pick up the items.

Some obstacles may include the many ships and animals that lurk in the

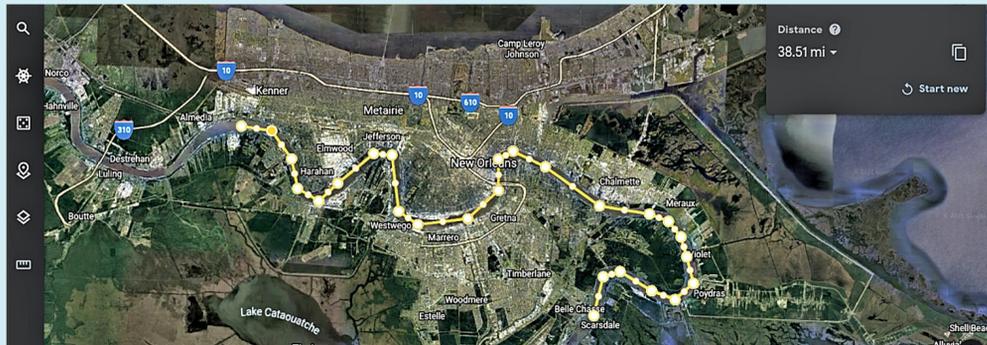
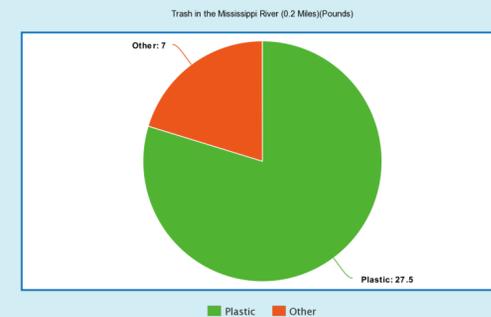
This method was very effective and we had every piece of trash and plastic collected in around three hours. The ending results were mind-blowing. If a group of people or friends go out to a part of the Mississippi River, all of the plastic in a one-mile radius can be picked up while having fun with some music and drinks.

We used the following equation to estimate the amount of trash along the Mississippi River through New Orleans.

$$(0.2 \text{ miles} / 34.5 \text{ pounds}) = (38.5 \text{ miles} / x) * 2$$

X = estimation of trash (in pounds) along one side of the MS through a 38.5-mile stretch.
 We multiplied by 2 to estimate the amount of trash along both sides of the river.
 X = 6,643 pounds of trash on one side of the Mississippi River and 13,286 pounds along both sides of the Mississippi River through New Orleans!

That 13,286 pounds is heavier than the biggest Stonehenge stone! This is incredible and sickening. This is only along 38.5 miles of the Mississippi River. Imagine how much trash is in the whole Mississippi River and how much wildlife and human life are affected. I got rid of approximately 0.003% of the trash along a 38.5 mile stretch of the Mississippi River. We will continue to collect plastic whenever we are near the river. We are now one step closer to a cleaner Mississippi River!



Top: (Rough) Distance of the Mississippi River through New Orleans

Left: Trash collection path (0.2 miles)

SOIL CONTAMINATION IN EDGARD

By Jayla

We believe that air pollution from a nearby plant, the Noranda Aluminum LLC manufacturing plant in Gramercy, has contaminated our soil with mercury. A 2015 article said this plant is the state of Louisiana's largest source of air pollution. According to the article, the plant only affects the Gramercy and Wallace areas. However, we constructed this experiment because we want to know if this is accurate, or if the contamination has spread further. We collected soil sampling. We did this because we wanted to learn if the soil near our school was contaminated.

This information is important to us because we are currently growing a garden that consists of many fruits and vegetables. We will consume the fruits of our garden, but if the soil in which they are growing is contaminated, we may be harmed. We learned mercury can also contaminate the water. If mercury is present in the water supply, we would be harmed as well. Mercury poisoning can result in memory loss, insomnia, headaches, and a variety of other symptoms.

Balloon Mapping

An experience I had through this curriculum that stuck with me was balloon mapping. For example, I learned how to use a balloon and a camera to map a particular location from this experience. I also learned how to put an image together by map-knitting. Working as a class felt productive because as a class we completed more tasks than I would have completed on my own. When balloon mapping, we first had to think about the places that would be a good idea to map. Then we had to gather the necessary materials. Afterward, we began the process of filling the balloon, which took about 10-15 minutes. We then tied the balloon

and put on gloves in order to secure the rope. The camera and the final materials were then connected. We then chose whether to launch the balloon 500 or 1,000 feet into the air. The photo would be clear if we sent the balloon 500 feet, but if we chose 1,000 feet, we would catch more of the area but the picture would be blurred.

Soil Sampling

In addition, the soil sampling was another memorable experience I had as part of this curriculum. This experience was memorable for me because I learned how to gather soil for experimentation. As a class, we worked together and took turns to efficiently collect different samples. Our first time collecting the samples, we didn't understand what we were doing. However, we eventually learned how it worked. We split up into groups and in just a few hours, we were able to obtain three sets of samples.

This knowledge will be beneficial in the long run, as I will need to test my soil for contamination if I ever grow a garden full of fruits and vegetables. I'll understand how to collect the samples because I've already learned how to do that from this experience.

Questions and Concerns

Do the residents of the community know that this plant could be releasing mercury in our area? If the results of our soil samples come back and prove that the mercury from the plant has spread to our area, how long has it been impacting our community? Why is the state not doing anything to stop the spread? Why is the state encouraging the plant to produce more mercury?

How May I Help?

By making a petition and asking people in our community to sign it, I will help lessen the issue of the Noranda Aluminum LLC manufacturing plant emitting too much mercury into the air. Another way I can contribute is by informing people in our community about the Noranda Aluminum LLC manufacturing plant's negative impact on us.

CHALLENGES AND DOING FIELDWORK

By Laila

Our soil is contaminated with mercury! Mercury contamination in soil, water, and air has been linked to human and ecosystem toxicity. Mercury pollution in various environmental media has risen as a result of industrial activity such as coal burning. This contamination is putting lives in danger. For example, my school recently started a garden of flowers, trees, fruits, and vegetables. And whatever is in the soil we are using will end up in the garden, and when we consume these fruits and vegetables, we are consuming mercury, which has the chance of us getting extremely sick and even dying. So, as you can see, this is a serious problem and we have decided to take tests and observations on our campus.

Considering the fact that this was my first time doing this, I actually had a lot of fun. A few days ago, my classmates and I participated in an activity for soil sampling and balloon mapping with a woman from Public Lab named Purl. During this activity, we ran into a small issue with the balloon. I was in charge of tying the balloon shut. And, turns out I needed to tie

“I wanted to protect our garden”

FROM AIR TO SOIL

By Kai

What Began This Experiment

What began our research was an article that talked mainly about the problems causing air pollution. While we read this article, we soon found out that the cause for the air pollution is a plant across the river in Gramercy. This plant causes air pollution by putting mercury into the air, and we later learned that mercury can harm or kill us. We are doing an experiment in order to find out if there are any more areas as to where mercury is located. Though we cannot actually see the damage, it is still there. This is why we are doing this experiment: to find ways to raise awareness and to possibly get others to try and help protect the environment. I feel like the government does not really care about this issue because they have yet to do something to help stop the spread.

Something I learned through hands on research and data collection

Something that I have learned through hands-on research and data collection is how great it feels to work with my classmates and how fun it is to plant things in the garden we worked so hard to grow. I have even learned things about some of the plants in our garden like how the plants look before they fully grow, what they need, and how much of it the plant needs so that I don't overfeed it or drown it.

I loved talking with my classmates and getting to know them better so that I can maybe try to better my friendships with them. To be honest, before we let the balloon go into the air, I didn't notice how pretty our school is or how high 500 feet is. So I'm really glad that my teacher and other classmates were there to help me out.

How did this inform understanding of place, my role within my community, of environmental advocacy?

This informed our understanding of place by giving each student or group a certain thing to do during this activity, like there were people who helped release the balloon, inflate the balloon, and there were some students building something in a separate area. The same things those students did during the activity they could use to help their community by doing those exact same things. Maybe the things we did here at the school will actually help the environment around us get better.

An experience I had through this curriculum that stuck with me

An experience I had through this curriculum that stuck with me was digging in the dirt. For some reason, I found it very interesting to dig in the dirt. I think it was the animals I found, such as worms and centipedes that made it so interesting for me. But, I saw these animals and went home and looked them up in order to learn some things about them and to know if they could harm or destroy the plants in our garden. So what I'm trying to say is that I wanted to protect our garden that we worked so hard to grow. I luckily found out that centipedes can not really harm gardens but instead they help the garden because they eat the insects that can intentionally harm the garden, like Japanese Beetles, Leaf Miners, Winter Moths, and Codling Moths.

Some challenges that we had

One problem we had was when we were trying to tighten up the balloon but the person who wanted to tighten it was not strong enough to tighten it. So to solve this problem we found someone else who could manage to tighten the balloon. Another problem we had was with soil sampling. Three girls in a group were sampling soil but then one of the girls had volunteered to build something with another group of people. So, in order to fix this problem, I volunteered to help the other two girls with the rest of their soil sampling.

How my time with this curriculum exercised my creative brain

The time with this curriculum has exercised my brain by making me question what other problems could there be in the environment around us and how can I solve them with my classmates as a team. And I would also like to know how we can get more people involved because people might not feel the same way as others.

“I got to actually feel like a scientist”

SOIL CONTAMINATION IN ST. JOHN THE BAPTIST PARISH

By Jahavon

Noranda Aluminum, which is the largest air pollution in Louisiana, released mercury in our area. We are doing experiments because we are looking for soil contamination in St. John the Baptist Parish. When we started a garden at West St. John High School, we were wondering if the contamination had spread this far.

The balloon mapping and soil sampling was really fun and informational. I also learned a lot of things: what's caused soil contamination and how our health is affected by it. Soil contamination or soil pollution is a part of land degradation. It is caused by the presence of chemicals or other alterations in the natural soil environment. According to the article, it states that when soil is contaminated with different substances, it can hurt the native environment. Many of these substances are just as toxic to plants as they are to humans.

This is very important to me because at school we have started a garden and we are planning to eat, which is why we talk about soil contamination. Soil contamination can cause humans to have blocked parts that stop their body from breathing, which may cause you to die and can also lead to exposure to heavy metals. Our class took soil samples. I realized that in some spots the grass was darker than the other parts of the grass. I thought that this could be a sign that soil contamination could take place

here but I am not really sure, but I will see when the results arrive. One of my favorite parts during this project was seeing a huge helium balloon, the biggest balloon I have ever seen go into the sky at least 500 feet, and could have gone to 1,000 feet. Even though 1,000ft would be more interesting, we would not have seen our pictures very clearly.

This is important because since I live closer towards the place where the spill was, which can affect how I breathe and survive, I may have to wear a mask just to go outside and take out the trash because the mercury is just so powerful and can cause health effects such as mood swings and irritability. This can cause many elderly people in our community to die and the population could go down because when released into the environment, mercury accumulates in water-laid sediments where it converts into toxic methylmercury and enters the food chain. In order to help, people could renew the soil and we could inform everyone what Noranda has done so we can have everyone prepare and help us to make companies like Noranda Aluminum more environmentally friendly.

After we did the balloon mappings, some of us got to build a microscope which was also very fun. While doing this microscope I got to actually feel like a scientist that could create a real-world invention made out of wood and screws with washers and wing nuts.

AND SOLUTIONS WORK

the black strap tighter and use another strap. At first, I was nervous because Purl said that if we didn't tie this balloon tight, all the air would get out and we would have to start all over again, and I didn't want to be the cause of that. So, some of my classmates decided to come to my aid. While this was happening, she asked us whether we should bring it up 500 feet or 1,000 feet. At first, we chose 1,000 feet because there would be more to see than at 500 feet. But, my teacher, Mrs. Darville, asked a question that made us all rethink our decision. "Yes, we would be able to see more, but do you think the quality would be better if it was higher?" So, in the end, we picked 500 feet.

Soil sampling was way more challenging than the balloon mapping. One of the conflicts we faced was time. We had a limited amount of time since it was our last class period. But, not only digging up the soil was hard. It was hard for me because it was thick and somewhat damp, making it to be heavy since it had rained a few hours before. So far, we are waiting for our results to come in.

