Pearl River Pollution

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Table of Contents

Abstract

This paper addresses that the Pearl River of Mississippi contains a large amount of pollution. This research uncovers that some of the pollutants dissolve in the river, while some of it still affects the community around it. This affects the entire Pearl River Basin, and is a problem to not only humans, but to the animals that reside nearby too. The Pearl River is one of the main water supplies in Jackson county. Considering that this problem affects all citizens and animals that are using the water, pollution is a major concern. It can create new diseases and could wipe out some species. Also, the government has done almost nothing to save this important river. The Pearl River was tested for nitrate and dissolved oxygen. This research is focused on looking for high levels of nitrate and large amounts of dissolved oxygen in the Pearl River. The goal was to make sure there were no unusual levels or amounts of these compounds. During the testing of the Pearl River, its nitrate levels became a lot more concentrated in lots of the areas. In the OD test, the dissolved oxygen levels had a massive increase in the summer of 2012. In conclusion, the Pearl River is polluted to a point of concern. Citizens should help by becoming more involved in the maintenance of the river and helping organizations dedicated to helping the Pearl River. Citizens can also watch their own impact on the river and make an effort to pollute less.

Research Questions

- How much pollution does the Pearl River contain?
- How does so much pollution reach the Pearl River?
- How does the pollution affect the general population?
- What is the government doing to fix the pollution problem?
- What more can be done to fix this problem?
- Why is it threatened?

Introduction

As with many places in North America, the Pearl River was inhabited for millennia before colonizers came. This river starts in Neshoba county, and according to Choctaw mythology, is a sacred site. Originally, these people and tons of wildlife thrived on the banks. However, when it was discovered by French colonizers, water travel was easier than land. The middle of Mississippi, which the Pearl River had access to, was rich with fertile soil. Therefore, as colonizers do, they swept through the banks and massacred the natives. Soon after the War of 1812, construction began to make the river more accessible. Fast forward to date, and now the river contains over 200 million pounds of pollution and flooding is a predominant problem.

Over 100 species can be found in the Pearl River. The freshwater that comes from this river provides drinking water for hundreds of thousands of people, and two federally threatened species can be found in the Pearl River. Several other endangered creatures can be found there, including the pearl darter (*Percina aurora*). Some species have not adapted at all in the river for years and are still relatively close to prehistoric ancestors.

The problem is that overflowing sewage flows into this river, putting endangered species and people who acquire fresh drinking water from the Pearl River at risk. People put garbage and sewage into the river. Along the banks, grasses that stop erosion are dying to floods before they can grow strong and do their job.

Research Methods

The Salinity Protocol Test

Materials Needed

o Tide Table for your area
o Thermometer
o Hydrosphere Investigation Data Sheet
o Conversion Table
o Water Temperature Protocol Field Guide
o Pen or pencil
o Hydrometer
o Latex gloves
o 500-mL clear, graduated cylinder

Protocol

1. In the Salinity section of the Hydrosphere Investigation Data Sheet, record the times of the high tide and low tide that occur before and after your salinity measurement is taken. Also record the place where the times from your Tide Table occur.
2. Rinse the 500-mL cylinder with the water you are sampling twice.
3. Fill the cylinder with sample water to within 2 or 3 cm of the top.
4. Measure and record the temperature of the water in the cylinder. (See Hydrosphere Investigation, Water Temperature Protocol Field Guide)
6. Gently put the hydrometer into the cylinder.
7. Wait for the hydrometer to stop bobbing. It should not touch the sides of the cylinder.
8. Read the hydrometer at the bottom of the meniscus. Read the specific gravity to three decimal places. Record the specific gravity on the Hydrosphere Investigation Data Sheet.
9. Look up the specific gravity and water temperature on the Conversion Table to find the salinity of the water. Record the salinity on the Hydrosphere Investigation Data Sheet as Observer 1.
10. Repeat Steps 3-9 using new water samples. Record the salinity measurements as Observers 2 and 3.
11. Calculate the average of the three measurements.
12. Each of the three measurements should be within 2 ppt of the average. If one or more of the observations is not within 2.0 ppt, do the measurement again and calculate a new average. If the measurements are still not within 2.0 ppt of the new average, talk to your teacher about possible problems.

The Dissolved Oxygen Protocol Test

Materials Needed

o Hydrosphere Investigation Data Sheet
o Distilled water
o Latex gloves
o Waste bottle with cap for used chemicals
o Goggles
o Pen or pencil
o Dissolved oxygen kit

Protocol

1. Rinse the sample bottle and your hands with the water you are sampling three times.
2. Place the cap on the empty sample bottle.
3. Submerge the sample bottle in the water you are sampling
4. Remove the cap and let the bottle fill with water. Move the bottle gently or tap it to get rid of air bubbles.
5. Put the cap on the bottle while it is still under the water.
6. Remove the sample bottle from the water. Turn the bottle upside down to check for air bubbles. If you see air bubbles, discard this sample. Collect another sample.
7. Follow the directions in your Dissolved Oxygen Kit to test your water sample.
8. Record the dissolved oxygen in your water sample on the Data Sheet as Observer 1.
9. Record their data on the Data Sheet as Observers 2 and 3.
10. Calculate the average of the three measurements.
11. Each of the three measurements should be within 1 mg/L of the average. If one of the measurements is not within 1 mg/L of the average, find the average of the other two measurements. If both of these measurements are within 1 mg/L of the new average, record this average.
12. Discard all used chemicals into the waste container. Clean your dissolved oxygen kit with distilled water.

Nitrate Protocol Test

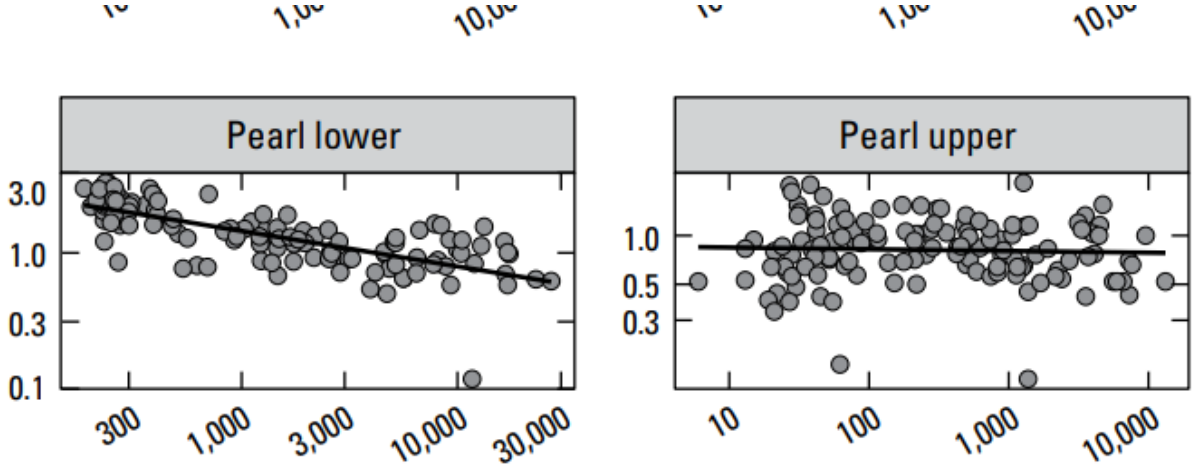
Materials Needed

o Hydrosphere Investigation Data Sheet
o Nitrate test kit
o Latex gloves
o Clock or watch
o Goggles
o Distilled water
o Surgical mask (if using powdered reagents)
o Chemical waste bottle

Protocol

1.In the Nitrate section fill in the kit manufacturer and model.
2. Follow the instructions in your kit to measure the nitrate nitrogen. You should use the Low Range Test (0 – 1 mg/L) unless previous results indicate that your site typically has greater than 1 mg/L nitrate nitrogen. If using powdered reagents, wear a surgical mask while opening these products. Use a clock or watch to measure the time if your kit requires you to shake your sample.
3. Match the color of the treated sample water with a color in the test kit. Record the value as ppm nitrate-nitrogen for the matching color. Have two other students match a color with the treated sample water for a total of three observations. Record all three nitrate-nitrogen values on the Data Sheet.
4. Calculate the average of the three measurements.
5. Check to see if each of the three measurements is within 0.1 ppm of the average (or within 1.0 ppm of the average if using the high range test). If they are, record the average on the Data Sheet. If they are not, read the color measurements again (Note: do not read again if it has been more than 5 minutes). Calculate a new average. If the measurements are still not within range and discuss possible problems with your teacher.

Results (Including GLOBE Data)



(Figure 1)

The graph tells us that the nitrate in the lower and upper areas of the Pearl River are very high in many places in the river upper and lower regions.

Table 6 Point Sources in the Watershed

Master AI	Facility Name	City	County	Lat.	Long.	NPDES Permit
70	Pilot Travel Centers LLC, Pilot Travel Center Number 077	Jackson	Hinds	32.273611	-90.192778	MS0054861
1451	Pursue Energy Corporation, Thomasville Gas Plant	Brandon	Rankin	32.160244	-89.984519	MS0033987
4369	OB Curtis Water Treatment Plant	Ridgeland	Hinds	32.391008	-90.0845	MS0046906
12162	Southern Natural Gas Company LLC, Rankin Compressor Station	Brandon	Rankin	32.288728	-89.914053	MS0051039
13066	Cleary Heights POTW	Florence	Rankin	32.155589	-90.177678	MS0036307
13136	Florence POTW	Florence	Rankin	32.135694	-90.131444	MS0025275
13147	Georgetown POTW	Georgetown	Copiah	31.869875	-90.155583	MS0020605
13203	Jackson POTW, Trahon and Big Creek	Jackson	Hinds	32.152164	-90.263889	MS0044059
13414	Terry POTW	Terry	Hinds	32.10595	-90.285008	MS0025224
13642	Autumn Light Personal Care Home	Terry	Hinds	32.091997	-90.285086	MS0023493
13710	Briar Hill Rest Home LLC	Florence	Rankin	32.182747	-90.126528	MS0029726
13723	Total Environmental Solutions Inc, Woodland Acres Subdivision	Florence	Rankin	32.178553	-90.123139	MS0030252
13744	B and G Utilities Inc, Brookwood Subdivision	Jackson	Hinds	32.211417	-90.268167	MS0031194
13795	TMJ LLC	Brandon	Rankin	32.210611	-89.956972	MS0033006
13844	Chukstop Car Wash	Jackson	Hinds	32.314278	-90.210833	MS0034991
13853	Wilson Enterprises, Quicky Car Wash	Richland	Rankin	32.206175	-90.150042	MS0035408
13872	N C Carwash	Jackson	Hinds	32.3035	-90.282528	MS0036471
13911	Rankin County School District, McLaurin Attendance Center	Florence	Rankin	32.143975	-90.023778	MS0038466

13933	High Place Retreat, The	Florence	Simpson	32.038414	-90.194889	MS0038971
13954	Poole Subdivision	Terry	Hinds	32.113639	-90.303944	MS0039845
13961	Ultimate Shine Car Wash	Jackson	Hinds	32.297806	-90.233639	MS0040096
13963	Rolling Hills Wastewater Inc, Rolling Hills Subdivision	Florence	Rankin	32.141531	-90.087181	MS0040134
13991	Hinds County School District, Gary Road Elementary	Byram	Hinds	32.191806	-90.299658	MS0042099
13998	Daily Equipment Company	Pearl	Rankin	32.268847	-90.079803	MS0042277
14000	Restoration Community Fellowship Church	Florence	Rankin	32.183161	-90.135514	MS0042579

14058	Friends of Children of Mississippi Inc, New Hope Headstart Center	Pearl	Rankin	32.190911	-90.077503	MS0044547
14062	Ridge Park, Wakeland Hills and Wildwood Subdivisions	Jackson	Hinds	32.220361	-90.336306	MS0044792
14076	Child Care Management Group, The Child Development Center	Byram	Hinds	32.198742	-90.297744	MS0045161
14095	Corporate Child Care Services Inc, Child Development Center	Terry	Hinds	32.199464	-90.297139	MS0045837
14153	Raworth and Harvel LLC, Country View Estates Mobile Home Park	Florence	Rankin	32.192861	-90.148583	MS0047856
14180	Ks Kids Learning Center Inc	Pearl	Rankin	32.244492	-90.115678	MS0048488
14229	Pine Ridge Mobile Home Park	Florence	Rankin	32.199306	-90.158389	MS0050482
14253	Haney Commercial Building	Pearl	Rankin	32.245278	-90.117414	MS0051063
14268	Siwell Utility Company Inc, Owens Road Subdivision	Terry	Hinds	32.181694	-90.353611	MS0051781
14327	G and J Enterprises LLC	Florence	Rankin	32.188469	-90.137306	MS0053821
14443	First Presbyterian Church, Twin Lakes Conference Center	Florence	Rankin	32.040983	-90.142356	MS0056600
14812	H and E Equipment Services LLC	Pearl	Rankin	32.278778	-90.175203	MS0056936
16033	McInnis Electric Company	Byram	Hinds	32.194167	-90.2525	MS0057711
16316	David K May Office Building	Jackson	Hinds	32.199358	-90.299136	MS0057819
16342	Oakview Utility Company Inc, Rowan Oak S/D	Jackson	Hinds	32.1665	-90.326269	MS0057835
16917	King Rental Properties Inc	Florence	Rankin	32.0926	-90.20065	MS0058220

18617	AAAG Mississippi LLC, dba Rea Brothers Mid South Auction	Pearl	Rankin	32.259458	-90.091689	MS0059846
18762	W G Yates and Sons Construction Company, Heavy Division Office	Jackson	Hinds	32.176722	-90.260111	MS0059323
18863	Star View Mobile Home Park	Florence	Rankin	32.115297	-90.053061	MS0059382
20390	Craig Estates Mobile Home Park	Florence	Rankin	32.09445	-90.191953	MS0059927
20634	Eddie Williams Mobile Home Park	Florence	Rankin	32.117131	-90.046886	MS0043621

(Figure 2)

Figure two is important because it depicts just how the Pearl River becomes so heavily polluted. Different counties contribute varying amounts of pollution, which adds up in the end.

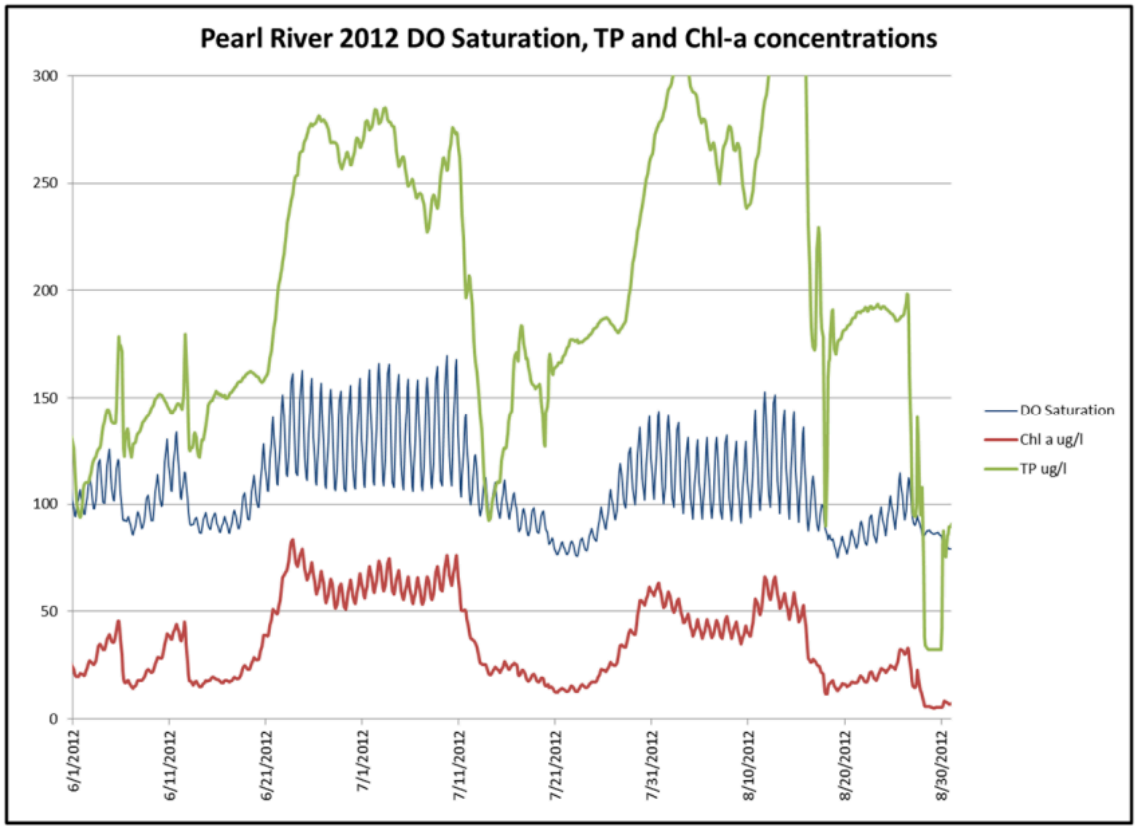
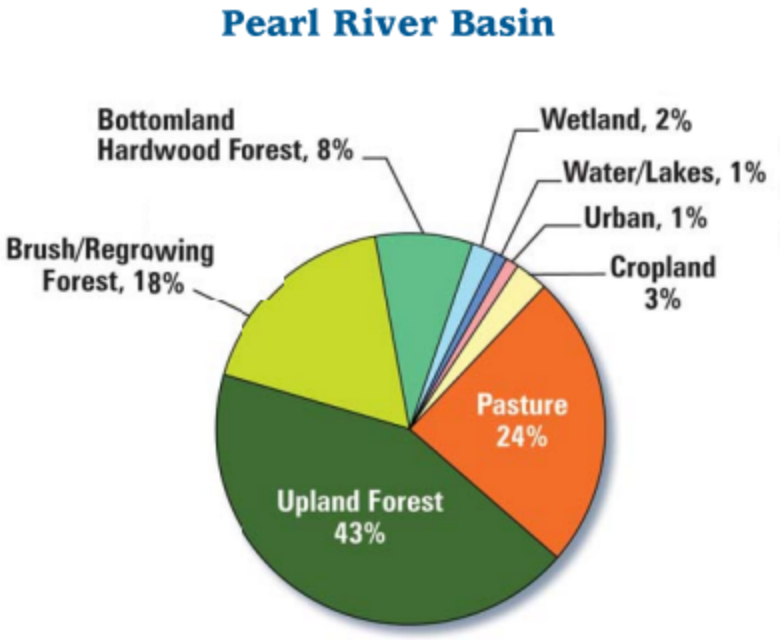


Figure 7 Calibrated Model Output Critical Cell Growing Season, 2012

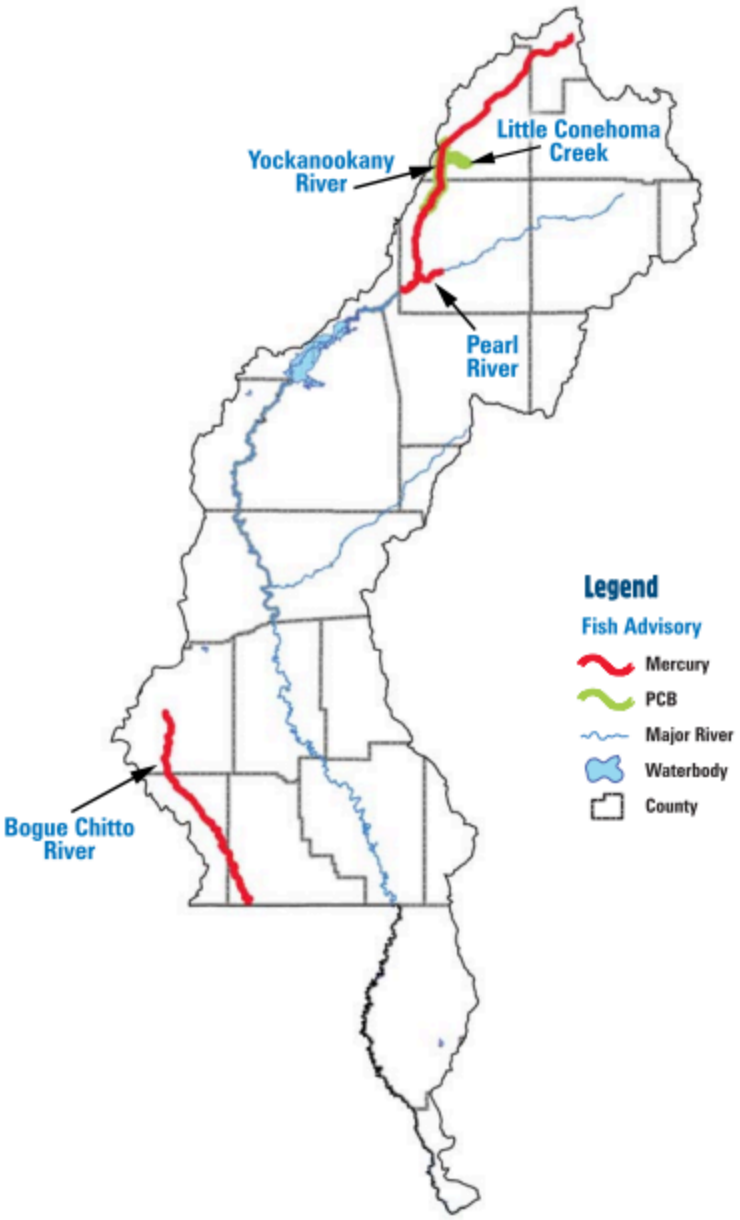
(Figure 3)

The blue line is the amount of dissolved oxygen that is in the Pearl River. In the summer the amount of dissolved oxygen in the Pearl River spiked by a large amount. Everything dropped on 7/11-7/31.



(Figure 4)

The graph depicts landforms and land use in the Pearl River Basin.



(Figure 5)

This is a map of the Pearl River's location along with other rivers.

Interview:

Q: How would you describe the overall condition of the Pearl River as of 2023?
A: She says that it is actually pretty clean, and flows into a fresh water reservoir. They do testing for bacteria and do other testing things for water like pH.

Q: How are communities on the banks affected?

A: There is an air pollution issue. She said that it is really important to keep an eye on creeks that may bring pollutants into the river. Factories (like the chicken farms) also cause an unpleasant smell.

Q: How did so much pollution reach the Pearl River?

A: There are some people that are permitted to pollute the river. Mrs. Brahman said that the idea is that there is so much water in the Pearl River that pollutants will dissolve. 1.8 million pounds of chicken poop go into the river from chicken farms.
Follow up question:
Q: Won't the pollution just build up until it becomes a problem?
A: They check to see if the Pearl River is doing well even with the current pollutants. If it becomes a problem,then they cut back on how much pollution enters the river.
Q: How does the pollution affect the general population?
A: Chicken poop, for example, can cause algae blooms that can be harmful. It can take all of the dissolved oxygen out of the water. This can cause problems with fish breathing, which can end up killing them.
There was also a spill of a chemical that ended up killing many fish.
Follow up question:
Q: What system helps catch problems caused by pollution?
A: The purity of the river when it comes to catching problems from pollution mostly relies on citizens being on the water and reporting issues.
Q: What is the government doing to fix the pollution problem?
A: PFOA does not break down, unlike many other chemicals. Recently, they have had public hearings. People come and tell what they are experiencing (how PFOA and other chemicals affect them). This results in more limits being created. These things (living near PFOA) can cause cancer if left unchecked.

Q: What more can the general population do to solve the pollution problem?

A: They can be on the lookout for signs of pollution, join clean up groups, and help support environment organizations.

Q: How are local wildlife and environmental factors affected by this?

A:An endangered species (name) lives in the Pearl River. People capture them and tag them. Their species lived with the dinosaurs and still live. They lay their eggs in the Pearl River. The (turtle) also is an endangered species found in this river. It is not found anywhere else. As far as the seafood industry is affected, it depends on how clean thPearl River is.

It is very important to fish and the enjoyment of people. It also affects land animals that drink from the Pearl, including livestock.

Q: What are organizations doing to stop the problem?

A: They do local river clean ups, look for bad signs in the river, and report to the environment authorities.

Q: How can you detect extremely bad environment events like the Horizon oil spill?

A: This oil spill wreaked havoc on the Gulf Coast. The company responsible for the oil spill still has to pay fines because of this event.

Q: Do you have a way to prevent accidents like the BP spill?

A: Sadly, most of our prevention methods stem from accidents that happen like the spill. Really, when things like that happen, we can come up with ways to prevent it.

Q: How are fishing and seafood industries impacted by pollution?

A: Fishing and seafood industries are negatively impacted by pollution because, if the Pearl is damaged, then there's no industry.

Q: How are land animals affected by pollution?

A: Land animals such as the Pearl river map turtle are affected because the Pearl River is the main source of water. If the main source of water is ruined, everything else will starve.

Tyson farms, Carthage, MS: Pickens creek

1.8 million lbs [100% nitrate]

Discussion

After researching, the above graphs have been found. Figure four depicts the components of the Pearl River Basin. For example, 43% of the Pearl River Basin is covered by upland forest. The smaller parts of the graph represent inhabited areas, lake areas, and wetland. Figure five shows the path of the Pearl River (what it flows through and what it affects). They work together to show how it has been polluted. It also shows how grasses and trees that help combat the major flooding are being eroded by human activities.

The long-rooted grasses live at the banks and keep soil intact. Human activities such as farming and deforestation erodes the roots, which causes flooding to be intensified.

Research also recovers that despite fine after fine, the government refuses to assist with local conservation efforts. To make matters worse, they also know this is happening. The Pearl River Basin is an important part of Mississippi geography and economy. Letting this basin go to waste will surely spell disaster for the larger part of Mississippi.

As stated above, figure two matters because it shows specifically how the Pearl River became very polluted. It specifies how different counties and cities contribute to the pollution of the river.

Conclusion

In conclusion, the Pearl River is a massive reserve for wildlife that has been abused for as long as colonizers have known of its existence. The result of such abuse is a large amount of pollution and plenty of flooding every year. The flooding of the river also causes even more problems for the plants on its banks. The long rooted flora native to the banks of the Pearl River would normally prevent the soil from eroding and falling into the river, but are always young due to the flooding.

43 establishments have over 10,000 people that are proven to contribute waste and pollution to the Pearl River.

The government is completely aware of this fact, but they choose to do nothing but pay the fines.

Soulution

One possible solution is to purify the water as it flows downstream to create clean drinking water. It would cost approximately 15 million dollars to purify the entire river as it flows. That, however, would destroy the sacred Choctaw site at the beginning of the river. Even if there was a way to make the purifying plant without destroying the site, the amount of pollution in the Pearl River would be likely to increase.

Another problem is that the constant flooding of the river is uprooting young plants that help prevent the river banks from eroding. The Coastal Wildlife Conservation Center recommends (insert funds).

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Figures 1 & 2 taken from Pearl River Basin