Irwin Creek

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This curriculum unit is recommended for: 2nd Grade

Keywords: Soil, clay, Urban Stream Syndrome, Water, Irwin Creek, Turbidity, Watershed, Uptown Charlotte, Mountain Island Lake, Catawba River

Teaching Standards: See Appendix 1 for teaching standards addressed in this unit. (Insert a hyperlink to Appendix 1 where you've stated your unit's main standards.)

Synopsis: This unit is in line with 2nd Grade Science Curriculum. In the 1st Unit students develop inquiry skills. They are encouraged to ask questions, listen, and observe the world around them. The term 'think like a scientist" is used to help them develop a curious mind. Students are encouraged to follow the five scientific method steps: Make an observation, ask a question, form a hypotheses or testable explanation, make a prediction based on the hypothesis, and finally test the prediction.

I plan to teach this unit during the coming year to 24 students in the 2nd Grade.

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Student Background/ Demographics

My school is one of 164 that make up the Charlotte Mecklenburg Schools district. My school has approximately 697 students with 70 teachers and support staff. The school population is 68% African American, 4.6% White, 19% Hispanic, 4% Asian, and .01 Native American. We also have an EL (English Language Learner) population of 6.5% and an AG (Academically Gifted) population of .7%. We are a Title One school which means we receive Federal Funding to supplement existing programs.

Rationale

Water is such a vital part of everyday life, yet we act as if there were a never-ending supply. The water we depend on is constantly being threatened by pollution, erosion, and just plain

neglect. There are over 3,000 miles of water ways in Mecklenburg County. Which means no matter where you live you are probable near one of them. Since we all depend on water it would be in our best interest to take care of every lake and stream, we depend on. I want to introduce my students to rich history and traditions these creeks, and streams, played in Charlotte communities. Science does not get its equal share of time in the classroom, but I feel it is important that students adapt a science mindset. What I mean by a science mindset is having the ability to make an observation, ask questions, make a prediction, test the prediction, analyze their data, and draw a conclusion. I feel this process done with water can resonate with my students. They are often amazed by aquatic life and are curious about the different waterways in their own backyard. I think they will be amazed to learn how the very streams filled with pollution now were once places families could swim and play.

Unit Goal

I would like my students to gain an understanding of the important roles creeks and streams played in the development of our city and neighborhoods. The creeks have falling into disrepair. We all need to be more aware of how our everyday lives can either positively or negatively contribute to the health of them. Achieving this goal requires a look at the history and social impact rivers and creeks paly in our society. I want to take an in-depth look at one of these waterways in Mecklenburg County, Irwin Creek. I will first give a historical background of how this creek helped the city of Charlotte develop its roads, and major highways. Not only did the creek help build Charlotte, but it also served as an important resource in some of historically Black neighborhoods. Unfortunately, like most Urban Streams, it has become polluted, and unsafe. What are some of the physically effects of Urban sprawl doing to our waterways? The more we build the more we clear the land of trees, and soil that helps absorb the water. As less and less water absorbed through the ground, where it can be filtered, the more runoff water we have that finds its way to creeks and streams. Keep in mind this runoff water contains chemicals and pollutants that find their way into our drains, streams, and creeks.
I want students to come away being more aware of their impact and how it effects their environment.

History of Irwin Creek

Irwin creek and Little Sugar creek are two creeks that run parallel and helped form Uptown Charlotte. Tryon, one of the main streets in Uptown Charlotte, follows a historical Native American trading path called Occaneechi. This path ran from Virginia to South Carolina. Not only did White settlers used this path to develop their wagon roads, but major highways and that run through and around the city presently were built from this path.

Irwin Creek starts in Northeast Charlotte, and includes some neighborhoods like: University Park, Double Oaks, Clanton Park, and Dilworth in its watershed. Another waterway that

flows into Irwin Creek is Stewart Creek. This combination waterway includes some historic landmarks in its watershed like Bank of America stadium, Ray's Splash Planet, Northwest School of the Arts, Johnson C. Smith, and Discovery Place, to name a few. In the Western portion of Charlotte, near the airport, Irwin Creek meets Taggart Creek. Together they form Sugar Creek, also known as "Big" Sugar Creek.

Irwin Creek was once a major provider of Charlotte's drinking water. In 1905 when residence complained about the turbidity from Briar and Little Sugar Creek the city decided to build a plant and draw water from Irwin Creek. The city experienced a terrible drought that lasted from 1910 to 1911. The drought nearly died up Irwin Creek, so the city decided to draw water from the Catawba River, or the area today known as Mountain Island Lake.

Unfortunately, Irwin Creek does not have that same reputation today. It is known as one of the most polluted Creeks in the state and has received a rating of "impaired" by the State's Environmental Offices. This rating is due to the water's turbidity and wide variety of species testing positive for various contaminants like copper, lead, zinc, mercury, and possible traces of human waste, or fecal coliform. [1]

As the city sought other means to supply residence with better drinking water, Irwin Creek played a very important role in neighborhoods it ran through. One neighborhood is Reid Park. Reid Park was created in the 1930's and 40's along Irwin Creek. It is one of many historical Black neighborhoods in Charlotte located off West Boulevard about 4 miles from Uptown. Residences Curley Hall, 83, and Laura Rankin recall having no electricity, or water gin their homes. The household had to rely on water from the Spring for drinking, cooking, and bathing. Mrs. Ranking remembers having to haul 10 or so buckets from the Spring to her house for about 4 or 5 years for the necessary water needed for their daily lives. She was asked if they had to boil the water before it was drinkable, she said:

> "No … it came from the Spring and it was pure.
> It was clear and it was good." [2]

She wishes the Spring could have been preserved for historical purposes because it was such a vital part of the neighborhood. It would be difficult to find a Spring nowadays. Most are covered up by pollution, construction, and steep locations.

Cultural events like Baptisms also took place in the Creeks. Ms. Hall can remember having to walk from her church, Shiloh Baptist, to the creek. Her church did not have a Baptizing pool, so members had to walk from the church to the creek, get baptized and walk back. She recalled the journey being long especially the walk back in wet clothes.

[1] (Hall and Ranking 2015)
[2] (Watch 2015)

Charles Mitchell, 63, remembers playing in the Creek with his Oaklawn neighborhood friends. They would walk in the creek, push each other down and even used a large pipe to cross over steep rocky portions. Mable Latimer, 79, remembers the snakes in the creek use to scare her and her friends from time to time.
Water helps kill germs and curbs epidemics

Water Quality

As we can see Irwin Creek has a long history of sustaining communities, but can its communities help sustain its wellbeing and survival?

Let us look at some of Charlotte's early history. When Revolutionary Statesman Hezekiah Alexander, built his home near springs on Briar Creek in 1760 he wanted access to safe drinking water. He not only did he get his wish, but other settlers followed his lead. Homes were built the was dammed to help business and the community thrive. Unfortunately, as useful as the Creek was it was not treated with the respect it deserved. It soon became a refuge for sewage and factory waste. Homes and businesses were built on its banks which lead to frequent flooding. By the 1950's it had earned the nick name" the smelly scourge of Charlotte." Worse than that, in a 1969 newspaper investigation a headline the statement "The Creek is Simply a Sewer" [3]

Something had to done to restore the conditions of the creeks. The history of their value was too much to ignore, Water Quality Commissioner, Rusty Rozzelle, challenged the County Commissioners in a September 1996 meeting. He asked:

> "How do we want to use our creeks and lakes in Mecklenburg County? To what degree do we want water quality preserved or restored?" [4]

To his surprise on October 15, 1996 the Commissioners adopted the policy that creeks should be suitable for "for prolonged human contact and recreational opportunities" and water life. This policy required a 35 to 100 ft. vegetation buffer beside most county creeks. It also forbids building directly near creeks." [5]

Fast forward 20 years and it is evident that the 1996 Creek Use Policy is far from where it should be. Most of the pollutants are not from big factories, its from run off on residential properties, and bacteria from waste.

To understand the water quality, you must know how it is measured. Mecklenburg County rates water on a 100-point scale system. The scale includes contaminants from bacteria, metal, phosphorus, and biological habitat and physical conditions. The official name of this

[3] (UP THE CREEKS 2015)
[4] (UP THE CREEKS 2015)
[5] (UP THE CREEKS 2015)

system is the Stream Use Support Index, or SUSI. According to Surface Water Quality Irwin Creek, between the months of July to September 2019, had a rating of 72. [6]

The most prevailing bacteria pollution problem comes from our sewer system. Most of the cities sewers plants run along creeks. It is a gravity-controlled system that puts our creeks in danger, especially if old pipes leak, or overflow. A large portion of the overflow can be attributed to household grease and oil traveling down drains. When grease and oil encounter chemicals in sewage a soap like substance forms. According to Charlotte Water director Barry Gullet. "It's a lot tougher and harder and firmer than the grease that congeals in your frying pan." [7]
Fortunately, the number pipe overflows due to grease has declined. This is thought to be the result of regular pipe cleaning and PSA's about not pouring grease down household drains.

Solutions

Now that we have outlined some of the problems, what are some solution to help sustain and care for our Creeks? All is not lost according to Christopher Matthews, Mecklenburg Parks and Recreation division Director for Natural Preservation and Natural Resources. Irwin Creek is the result of countless homes, roadways, and industry proximity. One of the biggest problems is the cost of creek cleanup, and restoration on land easement. Land owned by the government can easily fund its own cleanup and restoration, but most of the land creek easement is located on private property. To help combat this problem Mecklenburg county host an annual Big Spring Clean, formally known as the Big Sweep. This event takes place on six sites around Charlotte and has pulled over 10,000 pounds of trash from local streams.

Cleaning up our streams in Charlotte may seem like a daunting task, but it is a task we must incorporate in our daily lives. The Creek have been a been a contributing part of Mecklenburg County history. We owe it to them to make sure they are preserved in a manner that continues to provide sustainable live in our communities. [8]

Urban Stream Syndrome

Have you ever walked through a Charlotte neighborhood swore you heard a running creek, but could not see anything? Then, after crossing the street, walking to the edge of the asphalt climbing over a guardrail you see a robust running creek. The edges looked as if Front Loaders were tasked with carving as much dirt out of the earth while maintaining some sort of topical structure. The description of this creek is one characteristic of Urban

[6] (Surface Water Quality 2019)
[7] (UP THE CREEKS 2015)
[8] (Hall and Ranking 2015)

Stream Syndrome. Urban Stream Syndrome can be recognized as arears near streams with steep declines and jagged edges. Contents of the stream may have high levels of contaminants that may harm the plant and animal life it supports. Although many factors may contribute to the cause several key factors include primary storm water runoff by drainage systems, water treatment plants discharge of waste or sewage. [9]

Buildings, business, and people are key characteristic of cities. These three entities must exist and thrive in the same space. Unfortunately, as all three expand the space they occupy does not. This fact brings increasing harm to environmental spaces such as waterways. More and more cities are finding their lakes, streams, and creeks victims of various pollutants. These pollutants include industrial discharge, mobile waste, wastewater, and runoff from urban landscapes.

Part of the problem is the more we build the more land we need. When we acquire the land, we strip it of the elements, like trees, that make water absorption possible. When weather conditions call for flooding or frequent storms the land suffer from poor absorption, and residence suffer from property damage.

Is there a Solution?

Expanding infrastructure is a reality we must face. Cities are not going away, and they are not shrinking in size. However, we can improve and clean up the waterway's communities rely on. A branch of the EPA call the Urban Waters Movement helps underserved communities improve and see how water and surrounding lands can benefit the community. They host activities like monitoring water quality to make sure the water in the community is at a safe level. They also partner with local communities foster increased connection, understanding, and stewardship of local waterways. [10]

Instructional Implementation

The 2nd Grade Unit Earth Systems, structures and Processes allows students to understand weather by making careful and detailed observations of the Sun's energy and its impact on weather. Although we do not specifically talk about the Water Cycle, my lessons will focus on the implication of water on the environment. Students will get an introduction of different types of elements and its ability to absorb water. First students will illustrate different ways they are familiar with how water is used their community. Then in will determine the different properties that define solid materials. This activity will have students classify different items in three categories: color, texture, and shape. After students define these properties, they will perform an experiment using two types of soil, and a medium piece of sandpaper (a small piece of cement would be ideal). The goal is for the students to see that the soil absorbs water onto the ground, while water runs off the sandpaper causing excess water to surrounding areas. The sandpaper, or

[9] (WALSH 2005)
[10] (EPA, Urban Waters: About the Urban Waters Movement 2020)

concrete, represents the material used for constructing city streets, and buildings. When it rains it is difficult for these materials to absorb all that water and it ends up running into nearby drains, creeks, and rivers. As the water falls from the sky it is mixed with pollutants on these surfaces, such as oil and chemicals. All that decay and rushing water erodes river banks and contributes to Urban Stream Syndrome. The last lesson allows students to view water ways that may or not suffer from Urban Stream Syndrome.

Day One Lesson

All living things need water to survive, and people use water in almost every area of their lives. Listed are some of the ways we use water. Students will look at descriptions of ways water is used in community. Students will draw pictures to illustrating each activity. Students will watch the video: "The Water Bodies: The Dr. Binocs Show"

Water Resources

Agricultural Industrial Farmers use water to grow crops.	Industrial We build dams for power generation

Household We use water to wash dishes	Recreation We go swimming in the pool

Day Two Lesson

Students will examine, compare, and record several objects. Students will see what qualities they have in common and how each one would react when put in water. Students will watch this video, Water Pollution, to understand what type of objects can pollute our water.

Discovering Properties of Solids

Standard:
2.P.2 Understand properties of solids and liquids and the changes they undergo.

Materials:

- Activity sheet (see below)
- Items for modeling: pipe cleaner, marble, hand lens
- Pipe cleaner
- Leaf
- Marble
- Feather
- Sandpaper
- Twizzler
- Cotton ball
- Rock
- Tennis ball
- Hand lenses

Directions:

1. Create an anchor chart titled “Describing Properties”. Show students three items - pipe cleaner, marble, and a hand lens. Ask students to describe the items and write the words they share out under the property they describe.

Color	Texture	Shape

2. Discuss and model how to use a hand lens. Distribute the materials to students and allow students to explore their properties.
3. Students record their observations on the Activity Sheet.
4. Ask students the following questions to foster higher order thinking:
    a. What properties do these materials share?
    b. What evidence do you have…?
    c. How could you prove...
    d. How will these items react when placed in water?

Students will use this Activity Sheet to categorizer and compare the items listed.

Describing Properties

	Color	**Reaction in water?** Sink or Float?	**Shape**	**Texture** How does it feel?
Pipe Cleaner				
Leaf				
Marble				
Tennis Ball				
Feather				
Sandpaper				
Rock				

Exit Ticket
Students will use the knowledge they learned about properties of solids to answer the Exit Ticket

Which object is being described from the chart below?

Object:	**Reaction in water:**	**Shape:**	**Color:**

?	Sink or float? Float	Square	Red

A. Ball

B. Shoe

C. Plastic Cube

D. Pillow

Answer: C
The plastic cube will float is square shape. The color does not matter because the other items would not fit the other descriptions.

Day Three Lesson

Essential	**Engage**	**Explain**	**Evaluate**
Learning Target: To learn and describe different types of material, including soil, and their absorbency. **Materials**: Sand, clay, loam (mixture of sand, clay, and silt), sandpaper, 4 - 11x14 plastic bins, 12 cups of water. (3 cups per bin)	Fill 3 bins halfway with the sand, clay, and loam. Line the bottom of the fourth bin with the sandpaper. "Ask the students which bin they think will stay wet longer after water is added?"	Tell students they are looking at materials that we have in our communities. Soil is the loose upper layer of the Earth's surface where plants grow. The sandpaper represents the streets and foundation which building, and road are made. While students are feeling and observing each item, ask: What do you feel? How does it feel? How does it smell? What do you see?	Once students have felt and observed all four bins ask: Which bin stayed wet longer? Was this what you predicted? Why do you think some items absorbed better than others? How do you think this effect the areas around these materials?

Day Four Lesson

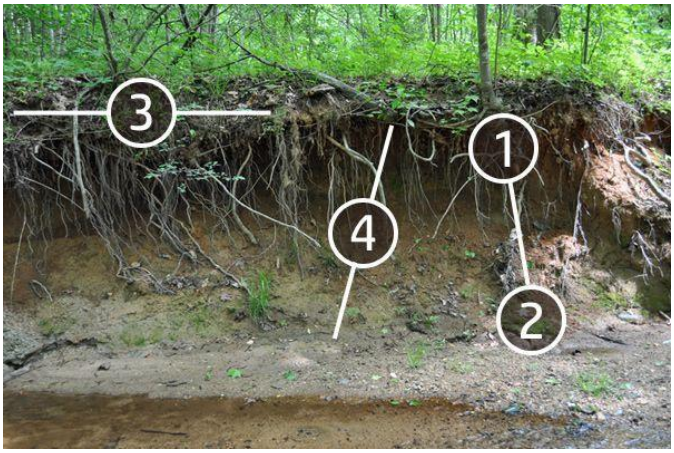
Students will watch this video about Urban Stream Syndrome. Students will determine, based on the photos, which area suffers from Urban Stream Syndrome.

Essentials	Engage	Explain	Activity
Learning Target: How urbanization affects stream banks. **Materials**: 5 pictures of various waterways	Students will have background knowledge Urban Stream Syndrome	How urbanization affects the physical structure of stream banks. Students will examine the banks of 6 different streams to decide if the stream is exhibiting symptoms of urban stream syndrome.	Students will view 5 pictures of streams and determine if they suffer from Urban Stream Syndrome.

Students will determine, based on the photos below, which area suffers from Urban Stream Syndrome. The teacher will show students two examples, one showing Urban Stream Syndrome the other a healthy riverbank.

Example 1: This stream **does** appear to suffer from urban stream syndrome.

1) The bank is vertically steep, with
2) exposed soil.
3) The closest vegetation is primarily tree cover.
4) The water surface is significantly below the bank.



Example 2: This stream **does not** appear to suffer from urban stream syndrome.

1) The stream bed is narrow.
2) The stream bank is not steep.
3) There is riparian vegetation.
4) The bank has no exposed soil.
5) The water surface is almost level with the bank.

Assessment

Do these three pictures of waterways suffer from urban stream syndrome? Why or why not?

Picture#1

Picture #2

Picture #3

Answer Key

Picture #1 Yes. Why? The stream has concrete banks, no vegetation, and a wide stream bed. The bank is steep, and the water level is well below the bank.

Picture #2 No. Why? The stream has a small but existent riparian zone. It has a gently sloping, fully vegetated bank, and the water level is at or slightly below bank height.

Picture #3 Yes. Why? The stream has a steep, exposed bank, a wide bed, and no vegetation. The water level is below bank height.

Appendix 1: Teaching Standards

Science

2.P.2 - Students know examples of materials that can be classified as solid and materials that can be classified as liquid. Students know water can be a liquid or a solid and go back and forth from one form to the other when heat is added or removed.

1.E.2.2 Compare the properties of soil samples from different places relating to their capacity to retain water, nourish and support the growth of certain plants. Students will compare the amount of water left between the three soil types and the sandpaper.

2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. Students will understand unabsorbed rainwater overtime creates Urban Stream Syndrome.

2.E.1.4 Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the seasons.

Social Studies

2.H.1.1 Use timelines to show sequencing of events. Student will learn how the use of creek have changed overtime.

2.H.1.3 Compare various interpretations of the same time using evidence such as photographs and interviews. Student will analyze pictures of now historical neighborhoods in Charlotte used waterways in their communities.

2.G.1.2 Interpret the meaning of symbols and the location of physical and human features on a map. Students will use interactive maps to see creeks, and streams near their neighborhoods and schools.

Literacy

RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. Students will examine and briefly explain what Urban Stream Syndrome is and how it effects the community.

RI.2.4 Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area. Student will be able to define terms like water shed, Unban Stream Syndrome, and turbidity.

RI.2.7 Explain how specific images contribute to and clarify a text. Student will see the effects of pollution on stream through videos and pictures.

Student Resource

Off to Class: *Incredible and Unusual Schools Around the World*- This is a nonfiction informational text that shows the hardships students in different countries face in order to get an education. The book gives several examples of how communities must be creative when it comes to educating its youth when natural disasters, like floods, destroy the surrounding landscape.

iPads- Some of the activities require student to access websites that have been hyperlinked to the lesson. Students may use the iPads for additional research about water ways near their homes and/or school.

One Well: *The Story of Water on Earth*- This book illustrates how water is recycles in the ecosystem, and how much we depend on it for our survival. It also discusses the harmful effects of pollution and water waste.

A Drop in the Ocean: *The Story of Water*- This book follows a drop of water as it cycles from droplet to vapor and back to water and describes its journeys in between.

Living in Cities- Since the dawn of civilization, humankind has managed to overcome natural obstacles and live in a wide array of environments. From high in the mountains, to the shores of flooding seas, to scorching deserts, Where People Live uses engaging photos and fact-filled text to examine the many places around the world that people call home.

Follow the Water from Brook to Ocean- This book explains how water flows from books to streams to rivers over waterfalls, through canyons and dams, to eventually reach the ocean.

Teacher Resource

Off to Class: *Incredible and Unusual Schools Around the World*- This is a nonfiction informational text that shows the hardships students in different countries face in order to get an

education. The book gives several examples of how communities must be creative when it comes to educating its youth when natural disasters, like floods, destroy the surrounding landscape.

SMART Board- Some of the activities require student to access websites that have been hyperlinked to the lesson. Students may use the iPads for additional research about water ways near their homes and/or school.

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Follow the Water from Brook to Ocean- This book explains how water flows from books to streams to rivers over waterfalls, through canyons and dams, to eventually reach the ocean.

What is Water Pollution? - This video uses the Dr. Binocs character to explain what water pollution is, what causes and how to prevent it.

Effects of Urbanization on Stream Ecosystems – This video explains as watersheds becomes covered with pavement, sidewalks, and other types of urban land cover, stream organisms are confronted with an increased volume of storm water runoff, increased exposure to fertilizers and pesticides, and dramatic changes in physical living spaces within the stream itself. This is geared for 4th or 5th Grade, but 2nd graders can understand this basic concept.

The Water Bodies- This video uses the Dr. Binocs character to show the oceans around the world. It should serve as a review of the continents and oceans they learned in 1st grade.

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Endnotes