A Single Drop of Water

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This curriculum unit is recommended for:
K5 Elementary, LI/TD, 2e, Horizons

Keywords: *turbidity, pH, dissolved oxygen, temperature, nutrients, watershed, water basin, urban waterways, nutrients, climate, wastewater treatment, toxicity, macrobiology, microbiology, pollution, aquifer, condensation, evaporation, freezing, glacier, melting, phase change, precipitation, reservoir, runoff, transpiration*

Teaching Standards: See Appendix 1 for detailed teaching standards addressed in this unit.

Synopsis: Charlotte's watersheds and waterways provide historical, geographical, and scientific context for students to explore. Without being "in" the water, they can certainly be immersed! Having a broad enough topic that can allow endless connections for students to make, affording them opportunities to "tap" into universal themes like: change, conflict, exploration, patterns, order and chaos, power, structure, relationship, systems, and adaptation(https://www.giftedworks.fyi/reading-instruction) is a hallmark of a strong thematic unit. Although lessons are a cross section of multiple content strands including arts, literature, mathematics, and social studies, the "hub" of this wheel is: wonder, observation, and discovery. In other words: SCIENCE!

I plan to teach this unit during the spring of 2021 to my Horizons K3 students. I hope to include 17 Horizons 'buddies' in grades 4 and 5. I give permission for Charlotte Teachers Institute to publish my curriculum unit in print and online. I understand that I will be credited as the author of my work.

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Evelyn Metcalfe

Introduction

Within the range of gifted students, highly and profoundly gifted students have instructional considerations and needs which must be addressed in planning. Students with twice or more exceptionalities add yet another layer of challenge and opportunity for teaching, learning and growth. Clanton Park offers students a prime opportunity to observe, test, map and monitor an urban waterway. Empowering students to take on the mantle of 'citizen scientist' can potentially have a profound impact on career choice, research, appreciation, avocation and advocacy. Addressing real-life problems brings authenticity and a sense of agency. These two elements in the classroom are often keenly desired by and needed for highly and profoundly gifted children, to help them utilize their gifts, lead them to feel they have a hand in steering their talents to make meaning and possible change.

Rationale

Learning differences in regular education students can be challenging enough to navigate. Twice exceptional students have underlying challenges that are often masked by their strengths. These challenges, if not addressed, can be debilitating. Lessons will be formatted using the Parallel Curriculum Model with intent to expand and advance students' capacities strategically and thoughtfully. The Horizons program was created for those students whose academic needs are significantly different from the regular TD program. Water, like intelligence, can be both blessing and curse. I'd like to capitalize on this metaphor while looking at potential challenges, solutions, latent resources that can be put to use. I want to somehow *tap into* and assign value to what may have been construed as 'problematic.' I want students to see challenges as opportunities. While engaged academically, my hope is that students benefit socially and emotionally as well.

One 2e instructor in New York, builds all her content around the hub of science. Kristen Berman bases her academic curriculum, *Origins*, on the "premise that these big questions show us that a young child needs to first see the big picture to make connections between prior and new knowledge." Teachers can set the stage for learning by highlighting a broad topic (like the universe or solar system), then tie the study of the world around us (life cycles and how life is sustained on Earth) back to the solar system (life on Earth follows a logical sequence of development). The natural curiosity for how things work and where things came from are our "biggest ally in working with 2e children.(Variations 2e Magazine. Fall 2018)

School Setting

Barringer Academic Center is a public, Title I, gifted magnet elementary in Charlotte's West Learning Community. It hosts the Academy, Learning Immersion, Talent Development, and Horizons programs.

Background

This is my 27th year as an educator. Although I began teaching in the regular education, within my first 5 years I was drawn to the field of gifted. I was hired to create a middle school gifted seminar program and to provide enrichment services for identified gifted elementary students (in my home state of Ohio). I obtained my Gifted Intervention Specialist License, KSU, in 2001. Six years later, my family moved to Charlotte. I became a part time TD Catalyst for CMS, then taught at private and charter schools before coming back to CMS, specifically Barringer Academic Center, in 2013. My hope was to eventually teach in the Horizons Program. I taught 2nd grade TD/LI until the position I now hold became available, in 2018. As it's described on the district's website:

The Horizons program was designed to meet the needs of highly gifted students whose academic needs cannot be met in the regular gifted Talent Development (TD) program for Reading and Math. (*CMS website*)

The pathway for entry is strenuous. The bar is set high. Parents seek out Horizons usually when a teacher or TD Catalyst point it out for consideration. Regular education teachers have been unable to differentiate enough. The student's academic prowess must be demonstrated far beyond that of their age/grade peers, oftentimes more than two grade levels. The students have at times suffered for lack of intellectual peers and challenging work that pushes them to grow. Some students have developed negative behaviors. Parents attend our open houses, desperate to have their child placed in a setting that matches their needs.

I come to this field with a good deal of personal interest. I've been deeply involved at a national level advocating for social/emotional support for gifted individuals at all stages of life. From 2014-present, I have served on the board of Supporting Emotional Needs of the Gifted SENG website, a nonprofit organization founded in 1981. It was during my first SENG Conference, 1996, that I was introduced to the realm of gifted. Several years later, when our eldest daughter was 4, we suspected she was gifted, as she began reading words like: "brachiosaurus" at age three. She LOVED dinosaurs. Once, as we sat on the shores of Lake Erie, I explained how the shoreline had changed over the millenniums. She suddenly burst into tears and said: "that means we're not going to live forever!" She'd leaped across an abstract construct of time and landed in a startling self-awareness of mortality. My husband and I suspected there was something more than giftedness. She had meltdowns over such simple things-getting a different brownie or sticker than expected. The wind from an open car window, too much sunlight, all were cause for distress. She was diagnosed with Sensory Processing Disorder, then Asperger's Syndrome (now Autism Spectrum Disorder). In the past few years I've learned of another ASD diagnosis called Pathological Demand Avoidance, which is formally recognized in the UK but not in the US. It describes debilitating anxiety mixed with Autism, a combination likened to 'bad dance partners.' Anxiety, perfectionism, lack of self regulation, executive functioning, all collide; steps and music out of sync. Add to that high intellect, and it becomes even more unwieldy.

I like the metaphor of tv reception for highly-profoundly gifted: three channels vs. streaming. A highly-profoundly gifted individual has data and processing speeds that increase exponentially. Living in our imperfect world, they (and parents) set high and sometimes unrealistic expectations, which can lead to anxiety and depression. If another condition/s is present, such as: ASD, dyslexia, ADHD, OCD, dysgraphia, the challenge for adjusting, functioning, and existing become all the more challenging. Horizons students don't all have multiple exceptionalities.

Some bear traits of exceptionalities that have yet to be diagnosed. An extremely high intellect can mask them, making it tricky for the teacher, parent, practitioner to tease out. Some find ways to compensate. Some self-diagnose. The further away IQ is from average, high or low, the propensity exists for heightened social/emotional and academic support.

Instruction

When I reached out to the Director of Bridges Academy 2e School, Chris Weibe, he recommended The Parallel Curriculum Model to help me frame my unit. By placing core knowledge (state standards) within proximity of authentic practice (citizen science), engaging students with their own natural curiosity of the world, and by providing opportunities for students to develop intrapersonal understanding and skills across disciplines, students will hopefully become engaged, both personally AND intellectually. They will be "MIND ACTIVE rather than MIND PASSIVE.(TEMPO, Vol. XL, No. 1, 2019.) This model is layered and complex, exactly what makes gifted learners thrive and engage.

Parallel Curriculum Model (PCM) Snapshot

Core	**Concepts and principles of a discipline**
Connections	**Concepts that overlap between disciplines and fields**
Practice	**Ways in which experts use and apply core knowledge and understanding**
Identity	**What we can learn about ourselves during this unit**

The PCM was designed to:

1. Provide multiple lenses for experiencing curriculum.
2. Help students develop self awareness within the disciplines and explain structures of our world.
3. Stretch and guide students toward higher level thinking.
4. Pose genuine and relevant questions that hold student interest and extend into other research questions/opportunities across disciplines.

Another resource I've utilized is: *Understanding By Design.* Wiggins and McTighe argue that "lessons, units, and courses should be logically inferred from the results sought, not derived from the methods, books, and activities with which we are most comfortable. Curriculum should lay out the most effective ways of achieving specific results… in short, the best designs derive backward from the learnings sought." (Wiggins and Jay 13-34)

Starting with the end in mind, I asked: "what do I want the students to know, understand, and be able to do?" I've never been one to 'teach to the test.' In spite of the fact that the third graders will be taking the EOG's for the first time this year, my focus has always been on critical

thinking, fluent and flexible problem solving. Their abilities should be sharpened for living and working in a complex and ever changing workforce. I've incorporated interdisciplinary lessons that help students think multi-dimensionally, as Nextgen Science(Nextgen) promotes and my experience with gifted children confirms.

Understanding By Design

Transfer			
Students will be able to independently use their learning to…	...trace storm water runoff to basins	....describe some of the challenges of urban waterways in Charlotte.	...analyze the ways Charlotte waterways have changed over time.
Understandings *Students will understand:*	*The definition of and distinction between human made and natural waterways*	*Urban waterways have distinct challenges*	*Natural waterways have been altered by humans for a variety of reasons*

Acquisition			
Knowledge *Students will know that:*	*Water is a finite source. It has been here since our planet began therefore needs protection.*		
Demonstrated Skills *Students will demonstrate skills in:*	*Describing the water cycle from any point.*	*Identifying local watersheds and waterways on maps.*	*Understanding which waterways flow to the Atlantic, Pacific and Gulf of Mexico (in the Northern Hemisphere).*
	Relating how wastewater is treated in Charlotte.	*Tracing the source of our drinking water in Charlotte.*	*Explaining how human adaptation can prevent flooding and erosion.*

Evidence	
Criteria	**Rubrics**

Assessment *Students will demonstrate deep understanding and mastery through:*	**Performance Tasks*** Gizmo Water Cycle Simulation and worksheets Stormwater interview Group work Original water creation myth Water sample testing Water basin mapping Science journal Erosion and water filtration experiments Independent Study

**Detailed in Learning Activities*

Summary of Key Learning Events in Parallel Curriculum

Curriculum	**Core** *(knowledge standards)*	**Connections** *(relationships across discipline, time, culture)*	**Practice** *(applying knowledge using methods of researcher and practitioner and scholar)*	**Identity** *(Intrapersonal; Character development; Strength based; Developing values and expertise)*
Universal Guiding Questions	What does this information mean? Why does it matter? How do the ideas make sense? What are the ideas for? How can I use the ideas to spark meaning and interest?	In what other contexts or settings can I use or share what I have learned? How do different lenses cause us to change earlier understandings? How does looking at one thing cause me to understand the other? Why do different people have different perspectives on the same issue? How are perspectives changed by events or circumstances? How is it helpful	Which problems, practices, issues, needs, and questions are developmentally appropriate for my students? Which resources, activities, and products provide opportunities for students' to act like a practicing professional within this field?	How do people in their discipline think and work? What are the problems and issues that practitioners and contributors in this discipline spend their lives working on? To what degree are these problems and issues intriguing to me? What is the range of vocational and avocational possibilities in this discipline?

		to examine a variety of perspectives on a problem? How can I help students evaluate pros/cons and tradeoffs of perspectives?		
Assessment	Pre-post unit student survey Pre-assessment (https://communitywaters.files.wordpress.com/2017/11/l01_worksheet-explanatory-model-where-does-stormwater-go.pdf) Post-assessment (same as above) Presentation Exit Tickets Quizzes Observation Experiments	Discussions, forum, seminars	Field work (independently, in peer group as well as with family)	Journal prompts that encourage introspection, connection, and self-assessment

Content	NC Science Standards: Living, Earth, Properties and Change	Art Music Math Geography Religion History Sociology Psychology Medicine	Role of Citizen Science	Critical thinking, growth mindset, personal goals

Essential Questions	Where does water come from? How is it here? Engage students in discussion of what they think. Have you heard any theories? How do we know a theory is plausible? Ask students to research and trace theories from the earliest to the most contemporary, paying attention to what has changed with more knowledge.	Are there myths or beliefs that explain the origin of Earth and its atmosphere? Are there stories that explain the presence of water or are related to water? Are there art pieces that address these myths, stories, beliefs? What are the ways throughout history humans have gotten their drinking, cooking and bathing water?	What is the water cycle? How can we prove that there even IS a water cycle? Who is in charge of providing clean water to Charlotte? Where does it come from? What is the process? When it rains, where does the water go? What's a water basin? What are Charlotte's waterways? Does climate change affect us in Charlotte? Are there things we can do as citizens to conserve clean water, check for pollution, understand our role as stewards of a natural resource?	Why is water so important? What are the challenges associated with too much or too little water? Are there any others? Have you experienced or observed a flood? Have you experienced a drought? Have you been so thirsty that you've become ill? Or haven't been able to drink enough when sick and become dehydrated?
Teaching Strategies	Socratic Seminar, individual or group research	Paideia Seminar using art, cultural myths and stories	Guest speakers: Charlotte Water, Charlotte Mecklenburg Park and Recreation,	Community Issues Forum surveying and framing

Learning Activities*	Gizmo simulation Webinars on wastewater treatment, clean water, watershed chemistry and water quality	Storytelling, origin myth evaluation and writing an original origin myth! Model: Joseph Bruhac's Keepers of the Animals & The Four Ancestors	Water sample testing at Clanton Park; storm drain observation with parent at home; Home watershed identification, EarthEcho Water Challenge Collect tadpoles for observation and data	Writing survey with questions for family, community on water use in home; EarthEcho webinars also focus on careers in STEM, which covers Identity as well as Core
Grouping Strategies	Match or complement temperament; Buddy with older student	Partners or well matched groups based on strengths, challenges, temperament	Possible community mentor (scientist, higher level student)	Journaling and introspection from readings
Products	Simulation, Independent Study	Community Issues Forum involving experts and stakeholders	Storm Water Monitoring Watershed/basin mapping	Journal
Resources	Student Interview Sheet; Explanatory model: Where Does Stormwater Go? Fantastic Filtration activity and Student Data Sheet	NIFI (National Issues Forum) Fine Art smithsonianmag.com artists in conversation-water Handel's Water Music Suite	Charlotte Storm Water Department USGS Charlotte Science articles	Readings: Poem: *Rhyme of an Ancient Mariner* (middle school) *A Long Walk To Water* by Linda Sue Park (middle school) *The Fisherman and His Wife*, Jr. Great Books (elementary) Time for Kids Reader *Where Water Comes From*

Extension Activities	In-Depth Study	Interdisciplinary project	Continuation of volunteering and data collection	Presentation Creative synthesis of understanding
Modification	Buddy class	Choice of products	Parent assistance	Reading levels
Pathways to AID (Ascending Intellectual Demand)	Provide students with more advanced reading, resources, and research materials. _____ Assist students in determining and using multiple perspectives on issues and problems. Have students apply what they are learning to contexts that are unfamiliar. _____ Design tasks and products that are more open ended or ambiguous and encourage independence. _____ Develop clear rubrics for tasks and products that include expert-level indicators. _____ Design tasks that require student reflection on ideas and information presented. _____ Encourage students to generate their own	Increase the unfamiliarity of the context or problem in which understandings or skills are applied. _____ Ask students to generate defensible criteria against which they weigh diverse perspectives on problems or solutions. _____ Call on students to develop solutions, proposals, or approaches that effectively bridge differences in perspective but still effectively address the problem. _____ Ask students to make proposals or predictions for future directions based on student-generated, discipline-related patterns from the past in a particular domain. _____ Have students search for useful	Guide students in establishing their own goals for work at what they believe to be next steps in quality for their own growth, and to assess their own work according to those standards. Make it possible for students to submit best quality exemplars of their own work to experts in a field for expert-level feedback Have students work on problems currently posing difficulties to experts in the discipline _____ Structure products and tasks to require students to engage in persistent, prolonged, written reflection about their own	Look for and reflect on "truths," beliefs, ways of working, styles, and so on that typify the field. _____ Look for "roots," or theories, beliefs, and principles in a field and relate those theories, beliefs, and principles to the time when they "took root" in one's own life. _____ Look for and reflect on the meaning of paradoxes and contradictions in the discipline or field. _____ Engage in long-term problem solving on an intractable problem in the discipline that causes the student to encounter and mediate multiple points of view and reflect

	methods and procedures to represent their thinking and solutions. _____ Include directions and procedures that encourage high quality work and help students assess their progress, seek and use feedback to continue improving.	connections among seemingly disparate elements (e.g., music and medicine or law and geography).	work and thinking in the field, with analysis and critique of those patterns as they evolve _____ Call on students to compare and contrast their own approaches to discipline-based dilemmas, issues, or problems with those of experts in the field	systematically on the experience. _____ Look for parallels (or contrasts) among personal prejudices, blind spots, assumptions, habits, and those evident in the field. _____ Challenge or look for limitations of the ideas, model ways of working, or belief systems of the discipline. _____ Ask students to reflect on their work and experience.

Learning Plan
Summary of Key Learning Events and Instruction
Lesson 1 Pre-unit Survey (See end of Learning Plan). Pre-assessment Stormwater Runoff Model. Students complete independently. Collect. Ask: *Where does water come from? Originally?* Engage students in discussion of what they think. Have they heard any theories? How do we know a theory is plausible? Ask students to research and trace theories from the earliest to the most contemporary, paying attention to what changed. Introduce ancient origin myths and explanations of natural phenomena. Read examples from Joseph Bruchac's *Four Ancestors*. Provide product rubric. Students write their own myth! *Myth (with rubric) & Interview*
Lesson 2 Share anecdotes from the interview. Conduct Taba (Gallagher pp. 11-17) 'inductive thinking' activities, gleaning what students know about Earth's life forms' dependence on water, using the process of: 1. Listing, 2. Grouping, 3. Labeling, 4. Subsuming or Regrouping, 5. Synthesizing (these activities may be spread out over several class sessions). This can also be used as a preassessment of knowledge and understanding, to help shape the direction, pacing and breadth of the unit in general. Is water finite? The Wonder of Wetlands also has activities for assessing if there is enough freshwater on earth: p. 158-161. *Taba Concept Development*
Lesson 3 Water Cycle Simulation (Explore Learning) to establish common vocabulary: *aquifer, condensation, evaporation, freezing, glacier, melting, phase change, precipitation, reservoir, runoff, transpiration.* Assign Independent Study and review expectations, due dates, rubrics and procedures. Students choose a related topic to investigate and present (independently or with a partner). *Simulation & Research*
Lesson 4 What are watersheds and water basins? In which watershed and basin do we live and go to school? (City of Charlotte Storm Water Education) *See Wonders of Wetlands p. 220 for watershed model and map making activities.* *Topographic Map Reading, Model Creation*
Lesson 5 What and where are Charlotte's water treatment plants? *Webinar*

Lesson 6
Wetland IQ Survey. Walk to Clanton Park, take water samples, test, survey macrobiotics and assess water health. See Wonders of Wetlands p. 102-103 on equipment and p. 176-187 for water testing. Charlotte Water provides testing kits to individuals and groups interested in adopting streams.
Field Work

Lesson 7
Share observations and interpret data collected in the field.

Lesson 8
Erosion Simulation. See p. 212 in Wonders of Wetlands for Wetland in a Pan activity.
Simulation

Lesson 9
Identify areas of interest to conduct Independent or Partner Studies drawing from the above lessons. Over the next 3-4 weeks, carry out research and experiments then share results in a presentation with parents, other classes, possible guests from community stakeholders (above).
Independent or Partner Study

Lesson 10
Fantastic Filtration activity at Earth Echo Challenge:
https://www.earthecho.org/educator-resources/snack-sized-science-fantastic-filtration
Activity

Fun Extensions
Select from games and activities from The Wonders of Wetlands during research: Hydropoly (p. 260-265), Wetland Address (p. 147-151), Life in the Fast Lane (p. 152-156), Springo! (p. 77) and Wetland Metaphors (p. 85-86). These will provide ideas for students to possibly make their own learning activities to incorporate into their independent/partner presentations.

Unit Culmination/Celebration
Film & Discussion: *Ponyo*
What are the messages this movie offers? Can you make any connections to the books, stories, experiences in this unit? Do you see any risks or opportunities for novelists, filmmakers and other artists who bring environmental awareness to their audiences through fiction and art?Do you have any more ideas to improve our world, now that we've completed this unit?

Alternative Activity and Culmination for Older Students: Discuss the environmental impacts of human population growth, development, climate change. Frame these challenges, stakeholders, possible options, pros, cons, trade offs. Create a survey for

residents and/or families at Barringer to relay understanding of urban water. Host a Community Forum with the Westside Community Land Trust.

Appendix 1: Curriculum

Essential Science Standards

1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).

2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water.

3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams.

4.E.2.3 Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.

4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).

5.L.2 Understand the interdependence of plants and animals with their ecosystem.

5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).

Appendix 2:
Wetland IQ Questionnaire[1] (True or False):

1. Wetlands are always wet.

2. Wetland plants must be able to handle times of receiving a lot of water and also times of little amounts of water.

3. Wetland soil has little to no oxygen.

4. Bog, swamp and marsh are all types of wetlands.

5. Wetlands are smelly, mush and insect infested areas.

6. Wetlands loss is the second leading cause of wildlife endangerment. Water pollution is the first.

7. Wetlands are not used by very much wildlife.

8. Wetlands have little value for humans.

9. Wetlands only occur in inland areas.

10. Wastewater can be cleaned by wetlands.

11. Floods can be prevented or not be as devastating if wetlands are present.

12. The continental U.S. lost over 60 acres of wetlands every hour, every day between 1780-1980.

Pre-post Unit Student Survey

Suggestion: Create Google Form using questions below. Record Date and collect email addresses from students to record pre-post unit response for comparison.

1. Do you enjoy science activities?* Multiple Choice Yes No Maybe
2. What is a citizen scientist?* Short answer
3. Do you think about water much?* Multiple Choice Yes No
4. Does Earth have an endless amount of water?* Multiple Choice Yes Maybe No
5. Where does the water in your home come from?* Short answer
6. Where does water go when you flush the toilet or when it goes down the drain in a sink?* Short answer
7. Where does water go when it rains?* Short answer
8. What questions do you have about water that you hope to have answered by this unit? Short answer
9. Does your opinion matter?* Linear Scale 1-5 Not Much Definitely
10. When you express your opinion do you feel that you are heard and understood?* Multiple Choice Yes Sometimes No
11. Do you think adults are the only ones who can make changes in our world?* Multiple Choice Yes Maybe No

[1] Lake Metroparks Outdoor Education program: Wild About Wetlands (source of Pre-unit Survey and Play)

12. Do you think you can make a positive difference in the world, as a young person?* Multiple Choice Yes Maybe No
13. Would you like to be a scientist when you grow up?* Multiple Choice Yes Maybe No
14. If you answered "no" to the question above, do you have another career idea? Short answer

**Required*

Wastewater Journeys Play:

https://drive.google.com/file/d/1aJPHED-v3H2MJzhJm97dkjqhz8d6nusx/view?usp=sharing

Journey of Charlotte's Water: https://charlottenc.gov/Water/Education/Pages/Journey.aspx

The Journey of Wastewater: https://simplebooklet.com/wastewater#page=12

Water Cycle Reader's Theater: https://www.yumpu.com/en/document/view/11276299/water-cycle-adventure-readers-theatre

Independent Study Presentation Rubric

Project Criteria	Explanation of Criteria	5 Exceptional Mastery	4 Advanced Mastery	3 Mastery	2 Partial Mastery	1 Not Mastered
Appropriate Topic Choice	Student chose an appropriate topic. Student had a strong guiding question that helped keep their work focused and on track.					
Preparation for Presentation	Student was clearly prepared for his/her presentation. He/she came to class with all of the materials needed for presentation and used written notes to help guide the presentation (not just notes to read word-for-word). He/she had a clear plan and executed it well.					
Clarity & Purpose	The purpose and direction of the student's project is made clear and evident through the presentation. If the project changed course over time, the student showed how that process evolved and what was learned from that experience.					

What Worked	The student showed he/she was thoughtfully engaged in the learning process by discussing in detail what went well over the course of the project.					
What Didn't Work	The student showed he/she was thoughtfully engaged in the learning process by discussing in detail what did NOT go well over the course of the project.					
Reflection/Blog	The student showed what he/she learned over the course of the project - not only in terms of content, but also what he/she learned about him/herself in the process.					
Output / Product	The student's project yielded some sort of product, skill, or knowledge that was somehow presented to the class during the presentation.					
Engagement	Student was engaged and working during ALL in-class sessions.					
Appropriate Materials Used for Project	Student brought in the appropriate materials (and/or used classroom materials) needed.					
Research	Student researched their topic in class and possibly outside of class.					
Prepared for Presentation	Materials and students were both prepared on the project due date.					

Notes:

_____

_____

_____

_____

"If I had the influence of the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things artificial, the alienation from the sources of our strength."

Rachel Carson

Appendix 4: Reading Material (organized by Lexile, Age or Guided Reading Level)

Primary K1	**Elementary** 2-4	**Upper Elementary to Middle** 5-8
All the Water in the World, George Ella Lyon 520L or GR L	A Cool Drink of Water (Rise and Shine), by Barbara Kerley GR H	A Long Walk to Water, Linda Sue Park 720L
We Are Water Protectors, Carole Lindstrom	Hope Springs, by Eric Walters 6-9 years old	Our World of Water, by Beatrice Hollyer 890L One Well: The Story of Water, by Rochelle Strauss 960 L
Scholastic News 2, *The Clean Water Warrior* February 2020 Vol. 76. No. 5	*The Fisherman and His Wife*, Jr. Great Books, Series 3 (1992)	
Ahearn, Dan. *Where Water Comes From.* TIME For Kids Readers: Harcourt Horizons, People and Community.		

Research and Extension Articles

Desalinization:http://www.livescience.com/environment/070625_desalination_membranes.html

How did Aboriginal People Manage Their Water Sources?
https://www.dnrme.qld.gov.au/__data/assets/pdf_file/0007/1408282/aboriginal-peoples-manage-water-resources.pdf
Water conservation: https://uncw.edu/ed/southafrica/conservation/lesson3_water.html
Water cycle: http://ga.water.usgs.gov/edu/watercycle.html
Water resources: http://en.wikipedia.org/wiki/Water_resources
Water saving tips: http://wateruseitwisely.com/100-ways-to-conserve/
Water use statistics: https://www3.epa.gov/watersense/our_water/water_use_today.html
Worldwide water crisis: http://unesdoc.unesco.org/images/0012/001295/129556e.pdf

Support Materials

Acid, Acid Everywhere, William and Mary Elementary Science Unit.
Besnoy, Kevin D. (2006) *Successful Strategies for Twice-Exceptional Students.* Prufrock Press.
Blue Planet Environmental Center, Duke Power, Huntersville, NC.Bowen, Ryan S., (2017). Understanding by Design. Vanderbilt University Center for Teaching. Retrieved [9/25/20] from https://cft.vanderbilt.edu/understanding-by-design/.
Bruchac, Joseph. *Four Ancestors* (1996), p. 50-70. Bridgewater Books.
City of Charlotte Water Department, Charlotte, NC
Erickson, Lynn; *Stirring the Head, Heart and Soul.*
Indicators of Impacts of Global Climate Change on US Water Resources: https://ascelibrary.org/doi/abs/10.1061/(ASCE)0733-9496(1999)125:4(194)
Interdependence organizing tool DPI: https://files.nc.gov/dpi/documents/curriculum/science/scos/support-tools/organizers/science/interdependence.pdf
Islandwood Community Waters Project, Seattle, Washington.
Nasco. Education Supplies: https://www.enasco.com/p/Stream-Table-Kit%2BSB01704.
Paideia Seminars
Phase changes: http://www.explorelearning.com/gizmo/id?557
Phases of water: http://www.explorelearning.com/gizmo/id?661
Tomlinson, Carol; (2002) *The Parallel Curriculum: A Design to Develop High Potential and Challenge High-Ability Learners,* Corwin Press.
Something Fishy, William and Mary Middle School Science Unit.
Water Works: A Physical Science Unit for High-Ability Learners in Grades K-1, Prufrock Press.
West Water conservation: https://uncw.edu/ed/southafrica/conservation/lesson3_water.html
Water cycle: http://ga.water.usgs.gov/edu/watercycle.html
Water pollution: http://www.explorelearning.com/gizmo/id?445
Water saving tips: http://wateruseitwisely.com/100-ways-to-conserve/
http://en.wikipedia.org/wiki/Water_resources
Water use statistics: https://www3.epa.gov/watersense/our_water/water_use_today.html
West Side Community Land Trust, Charlotte, NC
Quest Nature Center Aquarium (Latta Nature Preserve, Huntersville, NC); opening Spring 2021 TBA
United Nations World Water Development Report 2020
https://unesdoc.unesco.org/ark:/48223/pf0000372985/PDF/372985eng.pdf.multi
https://www.npr.org/people/4494969/nell-greenfieldboyce

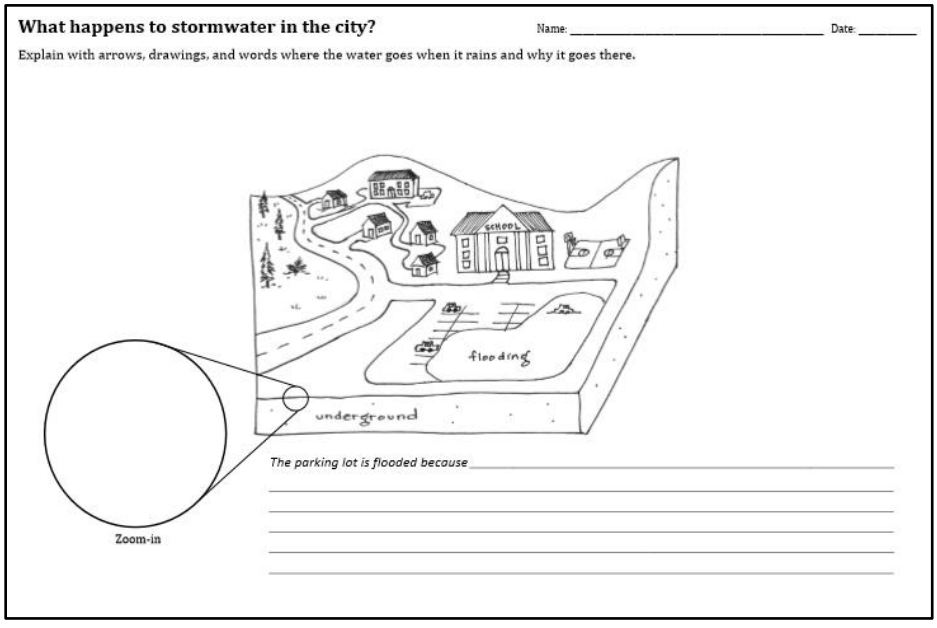
https://files.nwesd.org/website/Teaching_Learning/HiCap/2015-16%20meetings/April%20mtg/Using%20Parallel%20Curriculum%20Model.pdf
https://www.nextgenscience.org/assessment-resources/assessment-resources
Wiggins, Grant, and McTighe, Jay. (1998). Backward Design. In *Understanding by Design* (pp. 13-34). ASCD.
Williams, Terry Tempest. (2019) *Erosion*, Sarah Crighton Books.
Woodward, John. (2009) *Eyewitness Water*. DK Publishing.Worldwide water crisis: http://unesdoc.unesco.org/images/0012/001295/129556e.pdf
Project WET: https://store.projectwet.org/educators-guides/water-activities-water-lesson-plans-educators-curriculum-guide-2-0.html
Kesselheim, Alan, Slattery, E. Britt, Higgins, Susan, and Schilling, Mark R. (1995) *Wow! The* Wonders of Wetlands, An Educator's Guide, 1995, Environmental Concern Inc. and The Watercourse
Ponyo, a Studio Ghibli film, directed by Hayao Miyazaki
National Issues Forum: https://www.nifi.org/en/educators-center#edu_k-12_head
National Geographic Education resources:
https://www.nationalgeographic.org/education/classroom-resources/
https://www.nationalgeographic.org/article/walking-watershed/
https://www.nationalgeographic.org/media/urban-water-cycle/
https://www.nationalgeographic.org/topics/resource-library-watershed/?q=&page=1&per_page=25
https://www.nationalgeographic.org/activity/in-your-watershed/
https://www.nationalgeographic.org/encyclopedia/watershed1/

Cross Curricular Materials:

Citizen science reporting: iNaturalist
https://www.smithsonianmag.com/arts-culture/eight-artists-conspire-about-water-issues-new-exhibition-180958207/
https://www.thenatureofcities.com/2018/07/14/artists-conversation-water/
Handel's Water Music Suite
Nasco. Education Supplies: https://www.enasco.com/p/Stream-Table-Kit%2BSB01704.

Appendix 5: Pre/Post Assessment

Students are given the following diagram to complete to assess prior knowledge (https://communitywaters.org/teaching-community-waters/lesson-1-flooding-in-seattle/):



Students are instructed to interview parents or caregivers using the following questionnaire. Class discussion will be held the following day:

Community Waters Pre-Unit Take Home Interview

Date: _____ Student's Name: _____

Adult's Name: _____

Instructions: *Interview an adult in your household to see what they know about stormwater in your neighborhood.*

Student reads:

At school we are going to be studying what happens to rain after it falls in our city. Rain water that flows across the ground is called "stormwater runoff." My class will be investigating where stormwater goes in our schoolyard and neighborhood and the problems it can cause. Then our class will be choosing a location with a stormwater runoff problem and designing a solution for it. I want to learn more about your experience with rain when you were my age. Can I ask you some questions?

Student asks adult following questions and records responses:

1. What did you like to do when it rained? Did you like the rain? Why?

2. Where did the stormwater runoff go where you lived? Where did it end up?

3. What is a story about the rain you experienced or were told when you were my age? Do you remember rain causing any problems?

4. Does our family or culture have any traditions or stories that connect to water?

After recording your adult's answers, flip the page over and have them ask you the questions on the back.

Adult asks student the following and records responses:

1. What do you like to do when it rains?

2. What have you noticed happen to rain on the ground?

3. Do you go outside when it rains during recess at school? Does the rain ever cause any big puddles or other problems around your school?

4. How are my experiences with rain the same or different than yours? Why do you think so?

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