**Unit Title: Watershed and Falling Creek Impact**

***Unit Description:***

The focus of this unit will be the Chesapeake Bay Watershed and our local impact on the health of the James River in respect to the care of Falling Creek. While working through this unit, students will gain an overall sense of responsibility and accountability for their actions and how they can make a difference in the health of our waterways. Students will make connections between the education of their community about the watershed and its impact on the health of our water both locally and regionally. Students will also make efforts to show their peers the importance of trees and vegetation in preserving the health of the creek and the role that wetlands play in filtering water run-off from the urban areas in which they reside. Finally students will discover the relationship between pollution and the health of the local waterways and the flora and fauna that are dependent in these aquatic areas.

Students will implement an outreach and community education program in which they will be advocates for the clean-up and maintenance of the watershed that immediately feeds Falling Creek. Students will plant trees and native plants in the riparian buffers, create and present educational videos and informative posters that will serve as outreach to the school and local community, and line trails and creek banks with educational signs.

The unit will be intermittently spaced out over the course of the school year.

***Unit Context:***

This unit will be kick started with a video and presentation about the health of our local waterways and a “shock effect” lesson on the contaminants that are floating in the James River. We will use this as the jumping off point for our lesson on pollution and human impact on the local water ways. Discussions will include river systems, riparian buffers, water monitoring, point and non-point source pollution, and human impact and effects on the health of the water that we are utilizing. The lesson plans will focus on educating the students on the types of pollution and human actions’ impact on the water in which they play, fish, and utilize for drinking and hygiene.

Students will be able to make immediate connections to the improvement of our local environment and how this relates to the health of the Chesapeake Bay. In response to world-wide concerns of water quality and our impact on the health of the world’s water supply as a whole, students will be able to make the connection between their behaviors and actions on the local level and the effects on the world as a whole. Students will be developing their communication skills and community voice throughout this unit and broaden their network while reaching out to the local residents.

Our project will integrate the use of technology, math, and science throughout the majority of the plan. Students will be using multiple websites to gather research on water quality and pollution and its impact on the local community as well as the world as a whole. They will be using skills they acquire in math and science to record, classify, and analyze data in order to reveal the relevancy of their project and demonstrate to the community the need for these clean-up efforts. The use of communication skills, group collaboration, advanced planning, and project implementation will assist the students in developing life skills that they will be able to translate into future endeavors.

***Learners Involved:***

This unit is intended for sixth grade students in a diverse classroom with multiple levels of academic achievement and culturally different backgrounds. The majority of these students fall in the population that is economically disadvantaged with almost 70% of the school’s student body receiving free or reduced lunches as well as breakfast. Many of the students in our school are English language learners and this project will also serve them. The participants will be educating their fellow peers and possibly the 4th and 5th grade students at our neighboring school. In addition to the elementary school students and peers at the middle school, the student advocates will be expanding their educational lessons on the watershed to their parents, community members, and other family members. The educational videos that they produce could very well be viewed by more than just our immediate neighbors and could potentially reach students in other locales.

***Standards & Goals:***

- **Service-Learning Standards**

- Duration and Intensity:

This project will consist of works conducted over a period of one school year with continued clean up days over the course of the school years to follow. Students will begin their investigations and planning for service during the fall of the upcoming school year. Establishing a relationship with the neighborhood association that has rights to the waterway will take place as soon as the students begin their preparations for the project. Students will initiate a neighborhood clean-up day that will seek to serve the association members, local community, and the environment as well. They will spend time in both Science and Language Arts preparing for their outreach to the community during the winter months completing written reflections on edmodo at designated intervals and compiling the data and information to include in their videos. Students will also participate in educational and research opportunities during the winter months in which they will have the water tested for quality and include these findings in their informational brochures to be distributed to their peers and the neighbors of the school and reservoir. As the spring approaches, the students will begin creating their watershed outreach videos and posting them on the school’s website, presenting them to the elementary school students next door, and presenting them to their peers on Earth Day. Students will conduct additional water clean-up day in the spring with the help of the neighborhood association as well as their parents and peers. Students will also make a final water quality test before completion of the project in late May in order to establish a basis for the assessing the impact of their service. Celebrations will be held at each of the clean-up days in the fall and spring with a final celebration at the close of the school year.

* Meaningful Service:

The goals for this service opportunity are designed to fulfill the educational needs of the students involved as well as help the local community clean up the waterway closest to their homes, and assist in the global efforts to make our water cleaner and safer for the environment as a whole. Many of the students in our school and their families use this waterway as a source of recreation and a provider of fresh fish. The health of the reservoir and the tributaries that feed it and the James River are directly linked to the health of the fish and the cleanliness of the water in which they swim. Throughout the project students will not only seek to clean up the waterways, but provide their community members with key information that will help them to make better choices when planning activities for themselves and their families that have a direct impact on the health of the water in their immediate vicinity. Students will be afforded the opportunity to be the educators and reach out to the adults in their lives in order to help implement change that will be long lasting. Through their service students will be able to visually see the impact they are having on the local waterways and establish relationships with older community members so that they can have a lasting partnership with their neighbors and even longer lasting impact on the health of the local environment.

* Links to Curriculum:

The unit as planned directly supports the standards that are required for sixth grade science in regards to the watershed, water quality monitoring, and science process skill acquisition. Throughout the planning phase of the service opportunity students will be engaged in activities that support the development and practice of science process skills such as planning, investigating, researching, and data collection and synthesis. Students will be afforded multiple opportunities to discuss their research and communicate it to one another as well as the community. The participants will also engage in actual water quality monitoring investigations and use this data as the basis for their research on the impact of their service activity. In addition to the data on the health of the waterway, students will also gain a better understanding of the impact of human behaviors on the watershed and the animals that inhabit the area surrounding the reservoir. Finally, students will further develop their understanding of the importance of preserving the environment and ensuring the health of the local water resources to support the sustainability of Earth’s water system.

* Youth Voice:

The students will be the driving force for this unit on the watershed. All facets of this service opportunity will be motivated by the wants and desires of the student participants. It is my hope that I will only be serving as a facilitator who guides when necessary and helps the students find resources when they become stuck. My students will be requesting community involvement by making the contacts with the neighborhood association as well other community partners. Students will be serving as liaisons to the neighbors of the school as well as their peers in order to provide education regarding the steps necessary to preserve the health of the local waterways and the tasks that will help to clean up the reservoir. In addition to the outreach among the adult community that supports the school, students will educate their younger peers at the neighboring elementary school and create videos that will be posted on the school’s website to make contacts outside our immediate vicinity. The participants of this unit will make all decisions necessary to make this a successful service project, one in which they will have complete ownership and a vested interest due to their ability to make the choices and hear their own voices within the community.

* Partnerships:

The majority of the partnerships for this project will arise from within the school amongst the teachers, staff, and fellow students. We will also be establishing a lasting relationship with the neighborhood association that has the rights to the reservoir’s surrounding land areas to which we will need access. The other partnerships that will be necessary for the success of this project will be established with a member of the Department of Game and Inland Fisheries and Department of Environmental Quality. Students will also be communicating with potential funding sources to initiate partnerships that will assist their project financially as well as establish grounds for in kind contributions from local businesses. One of the most valuable partnerships that will be established throughout the course of this service opportunity will be that between the students, their parents/guardians, and the neighbors in the immediate vicinity of the reservoir. Working together toward the common goal of cleaning up the reservoir and ensuring the preservation of the land surrounding the waterway will create a bond between these students and the community they seek to serve that will hopefully be long lasting and lead to future interactions within this group of participants.

* Diversity:

This unit plan will provide the student participants multiple opportunities to develop their appreciation for diversity within the community. This includes the classroom, school, and neighborhood communities within which the students will be serving. Throughout the planning phase the students will be exposed to the many different viewpoints on the importance of the reservoir and the neighbors’ ideas of how the waterway should be handled. They will also experience dissenting ideas and attitudes from some community members who have little experience with children of their age group or who have had negative relationships with students from the school in the past. These interactions will provide the students with occasions to demonstrate their knowledge and further develop their communication and interpersonal skills. Students will have many chances to overcome the stereotypes of the middle school student and those that they may possess regarding older community members. These service activities will provide all those involved with a common goal through which they can learn to work together, look past differences, and debunk misconceptions of one another.

* Reflection:

The students involved with this service-learning unit will participate in reflection activities on a regular basis using the platform of edmodo. It is my intention for them to reflect on their experiences as well as their knowledge gains before, during, and after the actual project. Students will also be using video technology and the Internet to post educational messages that can be shared with public through which they can document their growth and understanding of the importance of the local waterway. Using the reflective component of this project will provide the students with a visual of their learning and a basis for comparison in the development of their attitudes regarding the importance of the reservoir. Throughout the unit the students will be given multiple opportunities to investigate and expand upon the importance of their involvement in this activity and how it further impacts their community and what that means for them as active, responsible citizens.

* Assessing Impacts:

Student participants will be able to gauge the impact of their service as they continue to observe and care for the reservoir and lands surrounding the waterway. In addition to the visual assessment of their actions, students will continue to monitor the quality of the water in the reservoir with the assistance of DEQ. Through continued contact with the community partners, students will have feedback on their performance as well as the effects of their service in the neighborhoods surrounding the reservoir. Students can assess the changes in attitudes and behaviors of the local residents by conducting surveys regarding their actions in their yards and around the reservoir. They will be able to see immediate impacts of their service by speaking with the community residents and documenting the changes they see around the reservoir.

* Sharing and Celebrating:

While participating in this service opportunity, students will have freedom to share their progress with the school community through the edmodo platform. In addition to the use of technology within the classroom students will also be regularly contacting their community partners to keep them abreast of the progression of the project. We will have mini celebrations throughout the unit so that students can revel in their successes. These mini festivities will serve to keep the students invested in the project knowing that they are making strides that are leading the way to change. At the conclusion of the unit’s activities, the students will participate in a celebration that will include the community partners/volunteers, school community, and parental support system.

- **Learning-Service Goals**

This unit will engage my students in activities that will enhance their middle school experience and improve their knowledge of how they can impact the community and also make a change that has positive effects on the world’s environment not just their immediate neighborhood. Students will leave from this experience with a new outlook on their role as civic participants and leaders with attitudes that will enact change in their communities throughout their public school experience and into their future endeavors. Students will grow and develop values that are not only necessary to be successful in school, but also provide for deep seated change in their thinking and willingness to impart their knowledge and enthusiasm within the school community and neighborhood at large. Throughout the activities in this service learning unit students will further develop their communication skills and grow into strong public speakers that are confident in their ability to reach the community. All of the components in this project are centered on educating the public and developing the skills necessary to communicate this knowledge in a way that is appealing and will provide the community with change that can be enacted following the guidance of the students. While completing the activities and research pieces of this unit, students will have an opportunity to experience complete academic immersion in a positive environment that is student centered. It is my intention to have them involved in every aspect of the project’s planning, implementation, assessment, and celebration so much so that they will be completely swept up in this unit of study.

* **State and National Standards:**
	+ This unit is designed to incorporate all four areas of STEM within the lessons that have been developed. While most of the lessons do not integrate engineering, the vast majority of the lessons incorporate science, technology, and math. Students will use technology to conduct research and convey ideas to others within the classroom as well as within the community at large. Science is the basis for all of the lessons with focus being given to investigation, data collection, testing hypotheses, analysis, and problem solving. Students will make connections to the natural world and develop an understanding of the nature of science. During their investigations students will use skills developed in math to analyze, evaluate, and understand data collected. Students will use this data to communicate patterns and relationships to demonstrate their understanding and knowledge gained. Finally through collaboration, planning, communicating, and sharing of data, students will meet the goals of the unit as designed.
	+ **State:**
		- * Science: 6.1, 6.2, 6.5, 6.7, 6.8, LS.1, PS.1
			* Technology: 8.1, 8.2, 8.4, 8.5, 8.6, 8.7, 8.9
			* Math: 6.2, 6.9, 6.18, 6.19
			* Engineering: Identify problem, design and create solution, communicate and evaluate results, revise and redesign.
* **County:** Chesterfield County has implemented guidelines and expectations regarding the development of 21st Century Skills in our curriculum and lesson planning. Focus within this unit is on collaboration, communication, and problem-solving.

**- *Assessment Plan***

**-** Student Progress:

* edmodo – reflections, polls, and quizzes
* observations – informal observations made by teachers and volunteers
* video outreach presentations
* written signs and posters that serve to educate the public
* letters and contacts made with the community
* final reflection at completion of the Watershed Unit
* online test on Watershed Test created through QuizStar
* Impact on Community:

Success of this project will be measured through the observations made of the community’s response to the students work and educational outreach. The students and I will be developing surveys to distribute to some of the community prior to the project and after the completion of the project. We will use the responses from these surveys to determine whether our service project has served its purpose and had a lasting impact on the local community. A general observation of the relationships established between the students and the community served will also give us a good measure of the impact we are having with our service.

* Impact on Partners:

We will conduct informal assessments of our success with our community partners throughout the process of completing our service unit. Students will be given opportunities to reflect on their success in relation to our partners by observing and documenting their experiences in a written format either in their service journal or on edmodo. Students will also conduct surveys with their partners to better gauge the success of their efforts through a critical review of the activities by the contributors involved. Again an overall general assessment of the involvement of the community partners and their attitudes towards our service will help to serve as a measure of our impact.

***Unit Lesson Plans:***

***Lesson 1 – Team Building and Engineering Activity***

* Timeline: This lesson will be taught within the first two weeks of the school year.
* Lesson Description: The lesson will serve as a team building exercise and will build confidence within each of the students and their abilities to work with their peers. Students will be issued a challenge to build the tallest and widest “building” using the materials provided. There will be a time limit of 10 minutes for the construction phase of the activity. Students will then take measurements of the constructed “building” and compare their results with those of the rest of the class. Students will extend the activity by calculating the cost of the materials used and the percentage of each type of material involved in the construction of their tower. Class data will be compiled to compare the differences between the percent of materials used and the height of the tower. Students will get an introduction to the process that engineers work through when making plans and actually constructing different materials/buildings/structures.
* Standards of Learning Objectives:
* Science: 6.1
* Technology: 8.6, 8.8, 8.9
* Engineering: Identify problem, design and create solution, communicate and evaluate results
* Math: 6.2
* Methods and Activities:
* Challenge to design and build the tallest tower will be announced at start of class.
* Students will be broken into groups of three and materials containers and activity sheets will be distributed. Material containers will have spice drops, toothpicks, and mini-marshmallows. One activity sheet will be distributed per group.
* Students will work for three minutes to sketch the design of their tower.
* Students will have 10 minutes to build their towers. Requirements will be explained by me and will also be printed on the accompanying activity sheet.
* Students will stop working after 10 minutes. Then each student in the group will take a measurement of their tower using a meter stick. Measurements will be recorded in cm.
* Students will then work together to tally up the quantity of each material used and record the data on activity sheets. Percentages will be calculated for each material used. Students will discuss and answer the questions on the activity sheet regarding the percentages of materials used.
* The groups will report their percentages and tower height to the rest of the class and all groups will record the information in their class results data table.
* Students will work within their groups to calculate the mean, median, and range of the class data set.
* Class discussion will follow to identify the relationship between the percent of materials and the tower’s height.
* Finally, students will calculate the percent of the total cost of each material. Students will then participate in a class discussion about the similarities/differences between the materials’ percentages and cost percentages for their tower.
* Reflection activity will close the class. Students will respond to the question: “What do you think drives the choice of the materials used by engineers and construction companies when building a structure or making a new technology?”
* Homework: Students will respond to questions on edmodo regarding their experience in this group activity. Students will have the opportunity to reflect on their involvement in the challenge, their peers’ involvement, communication, and overall experience.
* Materials/Resources/Partners:
* Lesson adapted from Moodle – Engineering with Phineas and Ferb
* Activity Worksheet from Moodle
* Spice drops
* Mini-marshmallows
* Toothpicks
* Meter sticks
* Calculators
* Goggles
* Pencils
* Methods of Instruction:
* Whole Group
* Small Group
* Individual
* ***Lesson 2 – Introduction to Earth’s Water Supply and the Health of Our Water Supply***
	+ Timeline: This lesson will be taught at the beginning of our unit on the Watershed.
	+ Lesson Description: The introductory lesson will serve as a shock effect, eye-opening experience for the students involved in this activity. I will open the lesson with a video on the health of the global water supply. Students will conduct research in groups on the sources of the contaminants in the water system and determine how much of this contamination can be prevented. While several students are conducting research at the computer research station, other groups will be reading articles provided by me concerning the health of Earth’s water supply and how human activity is changing the dynamic role of water in plant and animal survival. Students will work to form opinions about the importance of a healthy water system to the survival of Earth and the relationship between human behavior and Earth’s overall health.
	+ Standards of Learning Objectives:
		- Science Standards: 6.5, 6.7
		- Technology: 8.7, 8.8
	+ Methods and Activities:
		- Video Presentation: Students will watch a brief video that will serve to shock and upset them concerning Earth’s water supply and its health. The video can be found at the following link: <http://www.youtube.com/watch?v=cC8-Mhp_RJU&feature=player_embedded>
		- Students will break into groups of six to conduct research to further their understanding of pollution in the world’s water supply. One group will start at the computers to search for statistics regarding pollution in the world’s oceans. The other groups will read articles provided by me with more detailed information about water pollution. While conducting research the students will record information they find in the provided worksheet.
		- The last ten minutes of class will be used for an open discussion led by the students to explore their findings and report to the rest of the class.
		- The class will close with a short animated clip showing the effects of toxic materials being dumped into the ocean. The clip can be found at the following link: <http://www.youtube.com/watch?v=m5zVASa0u9g&feature=related>
* Materials/Resources/Partners:
* Internet
* YouTube videos listed above
* Water Pollution Articles (Class set predetermined by me.)
* Worksheet for notes and statistics
* Methods of Instruction:
* Whole Group
* Small Group
* Individual

***Lesson 3 – Chesapeake Bay Watershed – Pollution in Our Largest Estuary***

* Timeline: Lesson will take place directly following lesson 2.
* Lesson Description: This lesson will serve to bring the health of Chesapeake Bay to the forefront in the students’ minds and help them to see the relationship between what we do and how we impact the Chesapeake Bay. Students will investigate and determine the main types of pollution that affect the bay and the sources of pollution including point and non-point polluters. Students will participate in small group research teams and develop their understanding of the types of pollution that are often found in our local waterways. Students will identify and present in graphical form the major sources of pollution that have been determined to be present in the Chesapeake Bay. Students will create educational posters and brochures to inform their peers of the problems facing the Chesapeake Bay and its wildlife.
* Standards of Learning Objectives:
	+ Science: 6.5, 6.7
	+ Technology: 8.5, 8.6, 8,7
	+ Math: 6.18
	+ Language Arts: 6.2, 6.5, 6.6
	+ Social Studies: US1.e, US1.f
* Methods and Activities:
	+ This lesson has been adapted and modified from the lesson on the VDOE website titled “Types of Pollution”.
	+ Students will begin the class in whole group discussion reviewing the major sources of pollution in the world’s water system.
	+ Students will then break into groups and be introduced to the four main categories of water pollution: toxic, sediment, nutrient, and bacterial.
	+ Students will then be given pollution cards and asked to determine which of the four categories the scenarios listed would fall within.
	+ Students will then discuss their answers with the rest of the class and we will determine which type of pollution we would categorize this as, point or non-point source.
	+ After completing this opening activity, students will begin their research on the forms of pollution found in and around the Chesapeake Bay.
	+ Students will record statistics and their resources to later report back to the class.
	+ Students will create graphical representations of the information they have discovered and recorded.
	+ The close of class will be a written reflection in which the students will respond to the following question: “Why do think ………. has been documented as the largest source of pollution? Are you a contributor to pollution in the Chesapeake Bay?”
* Materials/Resources/Partners:
	+ Lesson and materials adapted from the following website: <http://www.doe.virginia.gov/instruction/science/elementary/lessons_bay/lesson_plans/types_pollution/index.shtml>
	+ Pollution Cards
	+ Internet access
	+ Research Note sheets
	+ Graph Paper
	+ Rulers
	+ Interactive Notebooks
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

***Lesson 4 – Chesapeake Bay Watershed – Mapping Where Water Flows***

* Timeline: This activity will follow lesson 3 and serve as part of the introduction to the watershed.
* Lesson Description: Students will investigate the Chesapeake Bay watershed using topographic and hydrologic maps. Students will work in small groups to read and identify the tributaries to that feed into the Chesapeake Bay. Students will determine which land areas are sources of run-off for major rivers and the bay in Virginia, Maryland, and Delaware. Students will focus mainly on the rivers in Virginia with special attention given to the James River. Students will use this information to help them determine the direction of run-off and the tributaries in which run-off from the school yard feeds.
* Standards of Learning Objectives:
	+ Science: 6.1, 6.5, 6.7, 6.9
	+ Math: 6.9
	+ Language Arts: 6.1, 6.3, 6.5
	+ Social Studies: US1.e, US1.f
* Methods and Activities:
* This lesson has been adapted and modified from the lesson on the VDOE website, titled “Journey of a Rain Drop”.
* Class will begin with a class reading of the *On the Way to the Chesapeake Bay: The Journey of a Raindrop.*
* Class discussion will follow where the students are asked to list the different substances that could be picked up by the raindrop on its way to the bay. Students should take notes on each of the pages of their handout as to what the raindrop may have picked up on its journey.
* As the class is conducting this discussion, students will come to the board to record the information on large piece of bulletin board paper that has a large raindrop drawn on it.
* Class discussion will follow with special attention given to the items listed that may cause harm to the water quality of the bay.
	+ Following this introductory activity, students will be presented with a large map of Virginia on the classroom screen. Students will be asked if they think they can determine where water flows when it rains.
	+ Students will join their previous research groups and given several different maps of the state of Virginia including topographic maps and hydrologic maps. They will also have a map that includes the entire Chesapeake Bay watershed land areas.
	+ Class will watch the multimedia presentation *Raindrop to the Bay.* Students will work within their groups while watching the presentation to follow the path of water from the Pamunkey River to the York River to the bay.
	+ After the presentation, students will work within their groups to determine where the water originates that enters the Chesapeake Bay using the hydrologic maps.
	+ Students will then work to determine what land areas that feed the four major rivers in Virginia that are part of the watershed: Potomac, Rappahannock, York, and James. Students will be making use of the topographic maps to make these observations and record the data on the info. sheets provided at the start of class.
	+ At the close of class students will be asked to identify our watershed at the school.
* Materials/Resources/Partners:
	+ Internet
	+ Multimedia presentation - *Raindrop to the Bay*
	+ Booklet: On the Way to the Chesapeake Bay: The Journey of a Raindrop
	+ Topographic map of Virginia
	+ Hydrologic map of Virginia
	+ Map of Chesapeake Bay Watershed
	+ Map of Virginia
	+ Service learning project folder
	+ Bulletin board paper
	+ Markers
	+ Pencils
	+ Department of Game and Inland Fisheries Website (maps)
	+ Lessons from VDOE – Lessons from the Bay: Journey of a Raindrop
* Methods of Instruction:
	+ Whole Group
	+ Small Group

***Lesson 5 – What is our Watershed Address?***

* Timeline: This lesson will take place immediately following lesson 4.
* Lesson Description: Students will be determining the watershed address of our school. Students will begin by creating their own topographic maps of the school grounds including buildings, grassy areas, and paved areas, forested borders of school grounds, and the reservoir and creek. Students will determine the flow of water on the school grounds and how it enters the local waterways and ultimately reaches the larger tributary that feeds the Chesapeake Bay. By the close of the lesson, students will write a set of directions to another raindrop on how to travel to the Bay.
* Standards of Learning Objectives:
	+ Science: 6.1, 6.5, 6.7, 6.9
	+ Math: 6.9
	+ Language Arts: 6.1, 6.3, 6.5
	+ Social Studies: US1.e, US1.f
* Methods and Activities:
* Students will be asked to explain what happens to a raindrop that falls on the school grounds. Discussion will follow about the possibilities and students will focus on runoff.
* Students will get into their project groups and will head outside to school yard with the following supplies: plain paper, pencil, clipboard, and tennis ball.
* Once outside students will draw a map of the school grounds making sure to include all attributes of the topography.
* Students will then be asked to make observations and inferences about where they think water will runoff. They will record this information on the back of the map they have drawn.
* Groups will then spread out around the property and have 5 minutes to test the effects of gravity on the direction the ball rolls. Students will record this information on their maps. We will do this in all areas surrounding the school. Students will be sure to properly label their maps with the features of the land around the school.
* After students have finished the active portion of the experiment, they will have several minutes to analyze their data and extrapolate the route the rainwater will most likely take when running off the school grounds.
* Class discussion will follow where one volunteer from each group will share their findings. Class will come to a consensus on the route that water will most likely travel.
* We will then talk about the different surfaces the water is traveling across and what effects this may have on the quality of water that runs off. Students will record this information on their maps and make additional drawings to further detail the effects on the quality of rainwater runoff.
* Upon returning to the classroom, we will view a map of our local watershed.
* Students will compare this map to a local topographic map that includes our school yard.
* In project groups students will determine the path the water flows from our school yard to the Chesapeake Bay. Students will highlight the route rainwater flows from our school yard to the Bay including all tributaries from small to the largest until it meets the Chesapeake.
* Students will orally give the directions the water travels to the Bay as I and a few other students use a piece of string to model the route on the large Virginia map. Another student will be recording the list of directions the raindrop travels on posted bulletin board paper. Students will need to include all the areas that the water flows across in the school yard before it meets its first tributary and the smaller tributaries before meeting up with the James River.
* After the string route on the map has been completed, we will calculate the distance the raindrop travels from our school to the Bay using the scale on the map. Students will record all of this information in the project folders’ note pages.
* At the close of the lesson, students will write directory from the point of view of one raindrop to another explaining how to make it to the Bay from our school.
* Homework: Students will write either brag or whine paper from the point of a raindrop that is running off our school grounds.
* Materials/Resources/Partners:
	+ Topographic map of Virginia
	+ Topographic map of the local area
	+ Map of Virginia
	+ Service learning project folder
	+ Bulletin board paper
	+ Markers
	+ Pencils
	+ Tennis Balls
	+ Clipboards
	+ String
	+ Calculators
	+ Department of Game and Inland Fisheries Website (maps)
	+ Lessons from VDOE – Lessons from the Bay: Journey of a Raindrop
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

***Lesson 6 – How clean is the water in Falling Creek Reservoir?***

* Timeline: This lesson will take place immediately following lesson 5.
* Lesson Description: This lesson will serve as the motivation for the service learning project and clean-up efforts of the Falling Creek Reservoir. Class will be introduced to the problems with the health of the reservoir and determine whether they want to take action to make a change in their community. I will be using this lesson to help them choose a meaningful service project.
* Standards of Learning:
	+ Science: 6.1, 6.5, 6.7
	+ Technology: 8.1
	+ Math: 6.18, 6.19
	+ Language Arts: 6.6
* Methods and Activities:
	+ This lesson has been adapted and modified from the Clean Virginia Waterways website, Virginia’s Water Resources – A Tool for Teachers lesson titled “Evaluating a Stream”.
	+ The class will begin with the presentation of an article published in the Richmond Times Dispatch which reveals health issues of the Falling Creek Reservoir.
	+ Class discussion will follow about the possible causes of the water quality issues in the waterway. Students will make inferences using the information gathered about water pollution sources during lesson 3.
	+ We will take a mini “field trip” to the Falling Creek Reservoir and students will make and record observations of the appearance of the water, any wildlife they see, and the surrounding land areas. Students will take notes on the potential sources of pollution that they can document through their observations. Several students will take pictures of the site for further documentation and use in their later works.
	+ Students will then perform water monitoring tests using the kits obtained by the school’s Science Department. Water samples will be taken from two different areas in the Reservoir, one in the shade of a riparian forest and the other from an area with little vegetation.
	+ Students will record their data on data sheets provided in water monitoring kits. We will discuss the need for multiple samplings over the course of the school year to analyze/compare the data from different times of the year.
	+ After samples have been taken and analyzed, students will revisit their initial ideas about the causes of health issues in the reservoir and formulate a preliminary conclusion based on their data and observations.
	+ The close of the class will be focused on the importance of the Reservoir to the community and what the students feel they can do to make a difference in the quality of water and the surrounding wildlife areas.
	+ Students will come to a consensus on the need for a service project to clean up the reservoir and surrounding land areas.
	+ Homework: Students will reflect on the day’s lesson using the platform edmodo by responding to the following questions:
1. Do you think the community values this natural resource?
2. Do you feel that the health of the Reservoir impacts your community?
3. How can you help your community understand the relationship between the health of this local waterway and its impact on the Chesapeake Bay?
* Materials/Resources/Partners:
	+ [www.worldwatermonitoringday.org](http://www.worldwatermonitoringday.org)
	+ Water monitoring kits from WWMC
	+ Internet
	+ Richmond Times Dispatch online article on health of Falling Creek Reservoir
	+ Goggles
	+ Gloves
	+ Data sheets
	+ Service learning project folders
	+ Pencils
	+ Cameras (library resource)
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

***Lesson 7 – Who Can Help Us? Will You Help Us?***

* Timeline: This lesson will take place during our Advisory period during the winter months in preparation for the clean-up and service project.
* Lesson Description: These sessions will address the need for help from community members, school community, peers, and family members to create a service project that will have an impact that is lasting. Students will be making plans for contact and requests for assistance from our community. Students will research, write letters, and establish relationships within the community using their knowledge of the need for a clean-up and educational outreach.
* Standards of Learning:
	+ Science: 6.1, 6.5, 6.7
	+ Technology: 8.2, 8.4, 8.5, 8.8, 8.9
	+ Language Arts: 6.1, 6.2, 6.7, 6.8
* Methods and Activities:
	+ Class will begin with a probing question to get the students thinking about the importance of community partners and the relationship this has the success of our project.
	+ Small group discussion will follow where students will list the people and/or companies who they feel can help us.
	+ Students will determine how we can enlist the help of their peers and their family members.
	+ While discussions are taking place, students will be writing the list of partners they want to involve.
	+ Once students have compiled their lists, a round robin will follow where they can share their ideas and we can create a master list of potential sources of assistance.
	+ I will then explain the need for a commitment from the neighborhood association that has the rights to the Reservoir to gain full access to complete their project.
	+ Students will then work in their Language Arts class to compose letters to community partners of their choosing to request help.
	+ Letters and all contact will be made no later than December of this year.
	+ Students will also draw up written agreements to be signed by both the community partner and the students to confirm the expectations of all parties involved.
	+ Students will bring to class the commitments that have confirmed through their outreach and these will be filed in our class service project binder.
	+ Throughout the process of establishing community relationships, students will reflect on the experience on our edmodo site.
* Materials/Resources/Partners:
	+ Language Arts Teacher
	+ Administration
	+ Peers
	+ Family Members
	+ Community Partners (student choice)
	+ Service Learning Project folder with notes and data
	+ Internet
	+ Printer
	+ Paper
	+ Contact information for community partners (determined by class)
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

***Lesson 8 – So, How Are We Going to Make a Difference?***

* Timeline: This lesson will take place over the course of the winter months during Advisory period. (Advisory meets every morning for 30 minutes.)
* Lesson Description: These sessions will consist of the students designing, creating, and publishing educational outreach materials. Students will also lay out the plans for the community clean-up day and determine the materials needed to complete the service project. Safety during the clean-up will be discussed as well. During these sessions students will also reflect on their progress, feelings towards the project, and responses from community members.
* Standards of Learning Objectives:
	+ Science: 6.1, 6.5, 6.7, 6.9
	+ Technology: 8.4, 8.5, 8.8, 8.9
	+ Language Arts: 6.1, 6.2, 6.6, 6.7, 6.8
* Methods and Activities:
	+ Students will design, create, and publish educational outreach materials addressing the importance of the Falling Creek Reservoir, the health of the waterway, its impact on the James River, and the role it plays in the Chesapeake Bay Watershed. The formats of the educational material to be created will include: brochures, posters, flyers, video presentations, and public announcements.
	+ Students will break into their small groups and come to a consensus as to which groups will work on the different components of the project materials.
	+ In addition to the educational outreach materials, students will compile lists of the materials they feel they will need for the clean-up day. Students will brainstorm within their small groups and share with the class so that we can create a master list of the materials we will need to procure before the day of the clean-up.
	+ Students will also create a survey to post on edmodo for students within the school to take prior to the educational outreach. This survey will include questions that test their knowledge about the Chesapeake Bay Watershed, run-off, forms of water pollution, and its effects on water quality.
	+ During their small group activities, I will initiate a conversation about the important safety precautions that must be taken in order to ensure a safe environment for all students and volunteers.
	+ Students will also determine the day of the clean-up and make contact with the established community partners to collaborate on the plans to finalize the service date.
	+ Periodically students will reflect on the progress of the project planning and creation phase.
* Materials/Resources/Partners:
	+ Service Project Folders with notes and data
	+ Poster Boards
	+ Cardstock
	+ Rulers
	+ Glue
	+ Glitter
	+ Markers
	+ Pencils
	+ Colored Pencils
	+ Digital video camera
	+ Cameras
	+ Pictures from Reservoir
	+ Computers
	+ Publishing Program
	+ Internet
	+ Librarians
	+ Language Arts Teacher
	+ Social Studies Teacher
	+ Math Teacher
	+ Administration
	+ Parents
	+ Peers
	+ Community Partners (determined by student choice)
	+ edmodo
* Methods of Instruction:
	+ Small Group
	+ Individual

***Lesson 9 – We are Making Change Happen in Our Community***

* Timeline: This lesson will take place in the spring of 2013 and be spread out over multiple different days and times.
* Lesson Description: Students will implement their educational outreach within the school and community. Students will be sharing with the community their plans to make change in the health of the Falling Creek Reservoir by publicizing the clean-up date and posting their educational videos on the school website and edmodo platforms. Students will be requesting the help of their peers within the school and enlisting the help of other teachers and faculty.
* Standards of Learning Objectives:
	+ Science: 6.1, 6.5, 6.7, 6.9
	+ Technology: 8.4, 8.5, 8.8, 8.9
	+ Language Arts: 6.1, 6.2, 6.6, 6.7, 6.8
* Methods and Activities:
	+ Students will be educating the school community about the need to protect and care for the Reservoir in the following ways:
		1. Making “Watershed” service announcements during the morning school address
		2. Displaying posters around the school
		3. Passing out brochures in hall
		4. Distributing flyers about the school wide clean-up day
		5. Posting their educational videos on the school website and edmodo
		6. Stationing groups outside the cafeteria to distribute information and request their peers to sign up for the clean-up day.
* Students will take their service outreach to the neighboring elementary school to educate the fourth and fifth grade students about the natural resource their backyard and inform the children on the ways they can help.
* Students will create and publish a post-survey on edmodo for students within the school to complete so that students can determine the impact of their service and outreach.
* Students will reflect on the impact of their project thus far in their project folders.
* Students will also communicate with their community partners on the success of the outreach and keep them abreast of the progress the class has made so far.
* Materials/Resources/Partners:
	+ Peers
	+ Faculty and Staff at FCMS
	+ Administration at FCMS
	+ Community Partners
	+ Pride Academy Teachers (those listed appendix)
	+ Faculty, Staff, and Administration at FCES
	+ Computers, Internet, School Website, edmodo
	+ Tables
	+ Sign-up sheets created by students
	+ Educational materials created during lesson 8
	+ Service Learning Folders
* Methods of Instruction:
	+ Individual, Small Group, Whole Group

***Lesson 10 – Reflecting on the Impact of our Project and Showing Gratitude***

* Timeline: This lesson will occur during the week following the clean-up day.
* Lesson Description: Students will participate in reflection activities during Advisory over the course of multiple days. Students will be orally sharing their experiences, writing about the project’s impact, and video tape responses of their peers to their efforts. Students will also write letters of thanks to their community partners and school partners.
* Standards of Learning Objectives:
	+ Technology: 8.9
	+ Language Arts: 6.7, 6.8
* Methods and Activities:
	+ Students will share their experiences throughout the project both orally and in written form. Students will respond to the following questions:
		1. *Do you feel that your hard work was rewarded with a successful outcome to the clean-up day?*
		2. *Do you think that your peers learned from your educational outreach?*
		3. *Did you experience a change in thinking about water and the importance of this natural resource?*
		4. *Do you think that this project will have a lasting impact outside the walls of this school?*
		5. *What do you feel was the best part of this project?*
		6. *What do you think needs to be changed? What didn’t work well?*
		7. *Would you do something like this again?*
		8. *Do you feel that your voice was heard by me? By your peers? By your community?*
* Students will compose hand written letters to express their gratitude to all the partners that helped to make this project successful and mail them out within two weeks of the clean-up day.
* Materials/Resources/Partners:
	+ Service Learning Folders
	+ Pencils
	+ Pens
	+ Thank you cards and envelopes
	+ Stamps
	+ Addresses for partners
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

***Lesson 11 – Green Careers and You***

* Timeline: This lesson will take place near the end of the school year after the all of the preceding lessons have been completed.
* Lesson Description: Students will explore the different opportunities available in Green Careers. Students will be introduced to the idea of being a steward of the environment and turning that energy and desire into a career. Students will conduct research on the multiple opportunities and new fields in Green Jobs. Students will create a classified ad for a career of their choice in the Green sector and post it to the class edmodo page and create flyers to post around the school advertising the opportunities to their peers.
* Standards of Learning Objectives:
	+ Science: 6.1, LS.1, PS.1, 6.2, 6.5, 6.7, 6.8
	+ Technology: 6.8, 6.9
	+ Language Arts: 6.7, 6.8
* Methods and Activities:
	+ Class will be started with a short video clip about green jobs and their importance to our economy and the environment. Video can be found on youtube.com, titled “Green jobs: finding Eco-Friendly Careers” by usnewsworldreport.
	+ Students will then make use of the computer lab to research green jobs. Students will record information that they find about a career that interests them. Students will be sure to include resources in their notes.
	+ Students will begin creating a classified ad to post on the class edmodo page. The students will design and publish their ad using Word or Publisher so that it can be easily uploaded to the internet.
	+ For homework students will create flyers to be posted around the school in a format that advertises the job to their peers.
	+ Students will include the following in their ads:
		1. What the job is and why it is important to the health of the world.
		2. How much education is required to obtain such a job and what branch of science this job comes from.
		3. How much employers pay for this position.
		4. The benefits of the position such as: creating new technologies, engineering new green products, cleaning the environment, helping to save lives, developing sustainable forms of energy, etc.
		5. Pictures of the work done in this field.
		6. Greatest accomplishments of people employed in this field.
* Students will complete one final reflection in their Service Project Folder about the likelihood of them entering a green field when they get older.
* Materials/Resources/Partners:
	+ Internet
	+ Computers
	+ LCD projector
	+ Screen
	+ YouTube clip “Green jobs: finding Eco-Friendly Careers” by usnewsworldreport.
* Methods of Instruction:
	+ Whole Group
	+ Small Group
	+ Individual

**Appendix:**

* **Additional Resources –**
	+ [www.youtube.com](http://www.youtube.com)
	+ [www.buzzle.com](http://www.buzzle.com)
	+ [www.all-recycling-facts.com](http://www.all-recycling-facts.com)
	+ [www.sutmundo.com](http://www.sutmundo.com)
	+ <http://waterstse..wordpress.com/world-impact/>
	+ [www.grinningplanet.com](http://www.grinningplanet.com)
	+ [www.fao.org](http://www.fao.org)
	+ <http://ocean.nationalgeographic.com>
	+ [www.unwater.org](http://www.unwater.org)
	+ [www.epa.gov/gateway/learn/water.html](http://www.epa.gov/gateway/learn/water.html)
	+ [www.chesterfield.gov/Utilities.aspx?id=8589941378](http://www.chesterfield.gov/Utilities.aspx?id=8589941378)
	+ [www.longwood.edu/cleanva/teachersvawatercurriculum.htm](http://www.longwood.edu/cleanva/teachersvawatercurriculum.htm)
	+ [www.dgif.virginia.gov/education/](http://www.dgif.virginia.gov/education/)
	+ [www.doe.virginia.gov/instruction/science/elementary/lessons\_bay/lesson\_plans/journey\_raindrop/index.shtml](http://www.doe.virginia.gov/instruction/science/elementary/lessons_bay/lesson_plans/journey_raindrop/index.shtml)
	+ <http://www.doe.virginia.gov/instruction/science/elementary/lessons_bay/lesson_plans/types_pollution/index.shtml>
	+ [www.worldwatermonitoringday.org](http://www.worldwatermonitoringday.org)
	+ [www.2.timesdispatch.com/mgmeida/file/456/state-James-2011/](http://www.2.timesdispatch.com/mgmeida/file/456/state-James-2011/)
	+ <http://water.usgus.gov/wsc/>
	+ [www.dgif.viginia.gov/education/sol/watersheds.asp](http://www.dgif.viginia.gov/education/sol/watersheds.asp)
	+ [www.deq.state.va.us/](http://www.deq.state.va.us/)
	+ [www.bayeducation.net/index.html](http://www.bayeducation.net/index.html)
	+ [www.chesterfield.edmodo.com/](http://www.chesterfield.edmodo.com/)
	+ [www.cbf.org](http://www.cbf.org)
	+ Lloyd, Jeremy and Register, Kathleen. 2003. Virginia’s Water Resources, A Tool for Teachers.