

## **Making a Difference: Every Action Counts**

*Nancy Ventresca*

### **Introduction**

*One of the most urgent issues facing humanity is fixing our broken relationship with the earth, on which all life depends. To do that, we have to think, feel and act differently.<sup>i</sup>*

There is no denying that we, as humans, have always had a significant impact on the natural world around us. With the world population at approximately at 7 billion, (up from about 1.6 billion in 1900) this impact is greater than ever before, with no end in sight. In fact, the United Nations has projected a world population of 9 billion by the middle of this century. Given our dependence on the earth's resources, there is no denying that all of earth's citizens need to be educated about the issues: the growing scarcity of fresh drinking water, the decline of nutrient rich soil to cultivate food, and changes in global climate. And that is the purpose of this unit. As trite as it may sound, our young people are our future. They will be the decision makers and planners and they need to be prepared for a modern world that needs to be healed and nurtured, just as much as they do.

And there is good news: humans have shown that we can take effective action when we are faced with a real threat to our life support systems. An example of this is the hole in the ozone layer that was discovered in the 1970s. Once we realized the severity of this situation, steps were taken to ban chemicals that contributed to the destruction of the layer and it has since moved back into what is considered a safe zone. This is something that I want my students to know and understand: change is possible and they CAN make a difference.

I have chosen to use literature as a "hook" to begin my unit. Students will be introduced to the notion that there are consequences to actions and that by recognizing and acting on a problem, change is possible. A variety of titles are widely available and I chose to use "The Water Wars" by Cameron Stracher because of our unique local water issues here in Delaware. Young students identify with strong characters and I am quite certain that my students in particular will connect with the issues faced in the novel. It will provide a lovely segue way to discussions and a Socratic seminar based on a nonfiction current event article regarding the state of Delaware's coastline and water quality. The culminating activity for this unit will have students playing the role of

expert on a local environmental topic of their choosing as they use their product to educate others in our community.

## **Background**

I teach at Thurgood Marshall Elementary School. It is a large suburban school in Newark, Delaware. Our demographics are diverse, with approximately 38% of students reporting their race as African American, 40% as White, 11% as Asian American, and 9% as Hispanic (DE Department of Education, 2011). Other characteristics include 7% of students are English Language Learners, 40% are from low income families, and 9% are identified as Special Education students. Ours is the largest district in the state of Delaware and it encompasses both urban and suburban populations.

I am responsible for challenging our top academic students as Thurgood Marshall's Enrichment Teacher. This means that I work with the students who perform in the highest 10% in the areas of Math and Reading. My groups are representative of the school's diverse population in terms of race and socioeconomic status. Although being in the program one year does not guarantee that a student will be eligible the next, many of my students qualify for my program year after year. Data used in the eligibility criteria include the Delaware Comprehensive Assessment System (Delaware's State Test), along with teacher and parent recommendations. The program begins in the first few weeks of school and students may enter the program at any time after a review by the school based Enrichment Committee.

This unit has been created for my fifth-grade Enrichment students. They are seen each day for a period of 45 minutes during an intervention time. Therefore, my students continue to have access to the regular classroom curriculum, in addition to the Enrichment program. Classes, along with lunchtime meetings for those who are interested, allow students to pursue topics of interest and to deepen their knowledge to share with others.

## **Rationale**

My intention is to inspire my students to be more mindful about their impact on the greater world around them, without scaring them with doomsday prophecies. Given that they are our top academic students, I see them as being our future leaders, scientists and policy makers. They are also our deepest thinkers and problem solvers. They are motivated to learn more and seek answers to their questions.

Although the fifth grade science curriculum includes an "Ecosystems" module, this unit will extend the theme and make further connections to Social Studies, English Language Arts, and Technology. The learning outcomes are many: work ethic (commitment to a team, personal responsibility and tasks) written and oral

communication, critical thinking, collaboration, numeracy, global and community engagement and the use of available technology.

### Linking Education and Environment

Given the current educational climate and continued education reform, there is constant and serious debate about what and how we teach. Today's high school graduates must be prepared to not only pass state exams, but to meet the ever increasing demands of post graduate schooling, careers and societal responsibilities. We must prepare our future citizens to make well-informed decisions and choices that will affect their environment and the environment for generations to come. By being given the opportunity to tackle complex, real-world issues, students can learn standards-based subject matter, build thinking and problem solving skills and develop life skills such as cooperation and interpersonal communication. For this reason, the environment can be a wonderful integrator. Activities are frequently hands-on, and students become engaged in a very meaningful way. They feel challenged, empowered and know that through knowledge and educating others, they can make a real difference.

### The New Standard: Eco-Literacy

If we can agree that my young students will identify with the challenges of the main character in the novel, then perhaps we can agree that there is great potential for the growth of empathy and knowledge. Their keen sense of curiosity will be then focused on their own world, as they begin to ask questions about their own environment and habits. Where does their electricity that powers their cell phone chargers and computers come from? What is the connection between their drink box of fruit juice and the lives of baby animals and birds thousands of miles away? What is the environmental impact of their throwing away paper and plastics every day? These are the types of questions for the students to really think deeply about! The apples they so casually throw away at lunchtime have already had an environmental impact where they were grown and students should have a greater understanding of where they came from, and at what cost.

### Move Over, Howard Gardner! There's a New Kind of Intelligence!

It has been over thirty years since Howard Gardner proposed the idea of multiple intelligences.<sup>ii</sup> He proposed that intelligence cannot be measured by a single "IQ", but that there are several different types of intelligence and that schools should be responsible for educating them all: bodily-kinesthetic, interpersonal, verbal-linguistic, logical-mathematical, intrapersonal, visual-spatial, musical and most recently, naturalistic.

In 1995, Goleman<sup>iii</sup> published research that shed light on yet another type of intelligence: Emotional Intelligence. The result of this work was that there five critical aspects of emotional intelligence that could be nurtured in schools: the abilities to know

one's emotions, manage those emotions, motivate oneself, recognize emotions in others and develop successful relationships. Continued research eventually led to yet another related intelligence: ecological intelligence. Goleman proposed that this type of intelligence makes use of social and emotional capacities by applying them to understanding natural systems and merges cognitive skills with empathy for all of life.

### Five Practices of Emotionally and Socially Engaged Eco Literacy

In striving to educate and nurture students to become Eco literate, the Center for Eco Literacy in Berkeley, California is dedicated to education for sustainable living. It has worked with educators and schools from across the United States and six continents and has identified five crucial practices that integrate emotional, social and ecological intelligence.<sup>iv</sup> By providing students with activities and carefully constructed learning opportunities, teachers can help their students to strengthen and extend their ability to live sustainably.

1. **Developing Empathy for All Forms of Life:** this practice encourages students to view humanity as integral members of the web of life, rather than seeing themselves as separate from and superior to other life forms. By changing their viewpoint, they broaden their care and concern to encompass a wider network of relationships.
2. **Embracing Sustainability as a Community Practice:** The quality of interconnectedness in a community may determine its longevity or destruction. By learning about the interdependence of plants, animals and other living things, students can be inspired to consider their own role in their community's interconnectedness and see the importance of thinking and acting cooperatively.
3. **Making the Invisible Visible:** this refers to helping students to recognize the wide ranging effects of human behavior on each other and the environment. By becoming more aware of the impact of our own behavior, we may be inspired to conduct ourselves in more life-affirming ways.
4. **Anticipating Unintended Consequences:** This practice requires predicting the potential ramifications of our actions as best we can, while also accepting that we cannot possibly control for all possible situations. It suggests that the result of systems thinking and the "precautionary principle" would likely be a way of life that defends rather than destroys the web of life. It would also build resiliency in the community by supporting the capacity of natural and social communities to rebound from unintended consequences.

5. Understanding How Nature Sustains Life: This is imperative for students to create and nurture a society that considers future generations and other forms of life. When we stop to think that nature has sustained itself on Earth for billions of years, surely we can learn something about sustainability by studying and applying these strategies to human life.

These five core practices combine emotional, social and ecological intelligences. By developing them in our students we can encourage a future population of people who will be well educated, cooperative and respectful of the earth.

### Issues Facing Delaware Today

More than half the population of the United States lives in a coastal area. This presence of water can unite economic and cultural forces, and the Delaware Estuary is a good example of this. It provides three states and hundreds of municipalities with plenty to claim in common.

The existence of the Delaware Estuary is of major importance to the people in the Tri-State area of Pennsylvania, New Jersey, and Delaware. Rivers, creeks and bays play a vital role in food production, transportation, energy, recreation, communication and employment. It is a kind of “natural capital” that has an estimated value of \$12 billion annually, providing over a half a million jobs to those who live in the areas.<sup>v</sup> In addition to these estimates, it also provides priceless opportunities for leisure and family activities.

According to a recent report by the Comprehensive Conservation and Management Plan for the Delaware Estuary<sup>vi</sup> our overall environmental health is deemed “fair.” There is evidence of improvement from the 2008 report, such as the discovery of new beds of freshwater mussels, but we continue to lose coastal wetlands more quickly than previously predicted. Other quick summaries of the current state of the Delaware Estuary include the following:

**Forests and Natural Areas:** We continue to lose forests faster than we can restore or protect them. This will mean future consequences for animal habitats and water quality.

**Water Use and Needs:** Although we seem to be coping well given our growing population, the demand for power and for public water will likely be a future concern.

**Fresh and Saltwater Balance in Drinking Water:** At present, this is seen as an area of relative strength in the report, but plans need to continue strict management in order to maintain this salt line for drinking water.

Water Pollution: the scientists involved reported that the Delaware River is “the cleanest it has been since before the Industrial Revolution”, yet it continues to be unsafe to both swim in or to eat from.

Contaminants: Although significant strides have been made to prevent and minimize the impact of accidental spills, the years of environmental abuse continue to be evident. Clean up is slow and costly, and unfortunately new contaminants continue to arise.

Animal Habitats and Populations: There is positive news for several native wildlife populations after intensive intervention. This includes indications of population growth in species such as the horseshoe crab, blue crab and osprey. However, the positive outlook is not shared by the Eastern oysters, the freshwater mussels, the Atlantic Sturgeon and the American Shad. Although there are some positive indicators, these creatures are still in peril.

In 2012, the Clean Water Act celebrated its 40<sup>th</sup> anniversary. It has been given the credit for bringing the Delaware River back to life after centuries of abuse. In fact, in the 1900s, the pollution in the Schuylkill and Delaware Rivers was so severe that it spurred the construction of the largest filtration system in the world at the time.

Another current and worthy topic for research is the practice of hydraulic fracturing (known as “Fracking”) in our ever increasing endeavor to find cheap energy. Large deposits of a gas rich rock called Marcellus Shale have been found in Northeastern Pennsylvania and fracking is an extraction procedure whereby deep wells are drilled into the layers of dense shale. The drilling then turns horizontally and charges are set to create cracks in the shale. Large quantities of chemically-laced water are forced down the wells, along with sand that holds the cracks open. The desired product is a relatively inexpensive source of gas fuel. At present, the current plan is to drill between three and five thousand wells over the next thirty years in the area.

Fracking not only produces a cheap energy source, it has many potentially harmful effects for the environments all around. The cumulative impact of this practice will not be known for years to come, but there is widespread evidence of severe consequences. There are some who tout the positive issues around fracking: energy independence from fossil fuels from foreign sources, jobs, and farmers being paid well for their mineral rights to land that they no longer farm. On the flip side, the negatives include the fact that there are huge quantities of chemically infused fracking fluid that must be disposed of. Because of the need to transport this deadly fluid, there is a higher chance of accidents and spillage. When these events happen, the fluid is spilled over the land, contaminating ponds and all forms of water. Nearby people cannot drink or bathe in the water that comes from their taps. Contamination of ground water and the destruction of once beautiful countryside seem to be an extremely high price to pay for energy.

These environmental concerns are but a sampling of the serious consequences of human behavior that has and will continue to affect our lives. Although my students are young, change in human behavior is crucial to our survival. By creating an awareness of environmental problems and encouraging them to inspire change in themselves and others, I hope that my students will see that they can make a difference in the world around them.

## **Unit Development**

### *Essential Questions*

- How does the spread of human development affect the environment?
- What are the implications of changes made to the natural environment by humans?
- What, if anything, can be done to repair or minimize the environmental damage?

## **Strategies**

After the initial introduction activity, the majority of the activities in this unit are student centered, with the teacher acting as facilitator: responding to questions, guiding and providing feedback. Students will observe, investigate, make inferences and form hypotheses. Problem solving skills will be applied to real world problems.

One instructional strategy used in this unit is the Socratic Seminar. This strategy provides the opportunity for students to actively engage in critical and creative thinking and communication. It is a highly metacognitive thinking collaboration that will lead students to consider questions such as “What can we do to reduce our negative impact on the environment?” and “what is MY role in local environmental issues?”

The independent and collaborative research activities included allow students to pursue their interest in a local environmental issue. Technology is integrated as students study, reflect, create and demonstrate their knowledge as they make presentations to others.

## **Activities**

The Classroom as Environment: Introduction to the Unit

Objective: This activity will challenge the students to explore the classroom as an environment. Since we spend a great deal of our everyday lives there, it warrants analysis. In making an *environmental inventory*, students will take a close look at the materials used in its construction and contents. Forms of energy used and available in the room, atmosphere, and position within the larger environment (the school) will also be studied.

Experiments can easily be conducted in this environment. A “population explosion” could be simulated by adding one new chair one day, then two, then four new chairs, and so on until the disruption stage is reached. A vacation for the custodian could mean that trash will require creative solutions. A tour of the school’s energy sources with the custodian will make the sources of energy more clear. How do we get power? Heat? Air-conditioning? Similarly, students can then conduct inventories of their homes and the ways that it is connected to the larger web/community.

Activity: Using Fiction to Promote Environmental Action

Objective: Novels can provide a powerful connection to young readers. Using a Literature Circle format, students will read and discuss the novel “Water Wars” by Cameron Stracher. (See teacher resources for other suggestions for literature with Environmental themes). Set in a future where water is extremely scarce, the story follows a young girl and her brother on a dangerous adventure trying to find their friend who has been kidnapped because of his ability to find what has become liquid gold. As the students read and discuss the issues and themes brought forth in the book, guide the discussion toward consideration of your own water delivery system and how/where the local water comes from.

Activity: Current Local Issues and the Socratic Seminar

Socratic Seminars can allow students the opportunity to achieve a deeper understanding about the ideas and values in a text. Text selection can include documents, speeches, literature, essays, art, music, poetry, etc. Pieces should be short, or an excerpt could be assigned. Participation in a Socratic Seminar helps students construct meaning through disciplined analysis, interpretation, listening, and participation.

Objective: Given local current events articles, students will systematically question and examine the issues addressed and articulate different points-of-view in the format of a Socratic seminar.

Current articles will be chosen from the local *Wilmington News Journal* and *Philadelphia Inquirer*. Given our recent turbulent weather, there is much available about the after effects of Hurricane Sandy, beach erosion, endangered species, water and air

quality, etc. In addition, our proximity to several “fracking” sites has this type of energy mining in the headlines quite often.

#### Activity: The Integrated Role Play and Case Study Approach

This teaching strategy combines the narratives of a case study with the simulation and gaming features of role play. By providing examples of real socio-scientific issues that need to be resolved, students are given the opportunity to investigate authentic issues and analyze the impact of differing viewpoints (a variety of community members) on the given situation. After presenting the case, students will be assigned roles such as farmers, town council members, owners of local businesses and markets and environmentalists. Students then use their interpretation of the character and their understanding of the content in the case to develop an opinion to share at the culminating public hearing. Through this role play, students become integral members of a social environment, research the science content, develop interpersonal and communication skills, reflect and collaborate with others.<sup>vii</sup>

**Objective:** Students will become immersed in an authentic scenario with an environmental issue. They will apply their skills and knowledge in an effort to devise a possible solution.

**Scenario:** There is a century farm near our school. It has been in the Walther family for well over one hundred years and farmed by the same family. They produce an heirloom apple from which seeds are harvested and replanted every year. This apple is unique to this farm. People come from far and wide to purchase and enjoy the Walther apples. However, Mr. Walther has no heirs and is becoming advanced in years. Recently while running a new sewage line to his house, an amazing discovery was made! A large gold nugget was unearthed on his land. He immediately hired a company to study his property to see if there was more and it showed great potential.

**Problem:** Given his age and lack of family to continue farming the land, Mr. Walther is considering selling his land to a mining company. This company would strip mine his acreage, running 24 hours a day to excavate every inch in search of gold. The owner of the mining company is unsure how long this project will take, but thinks it will be at least five years. Obviously, this will have positive and negative consequences for the people and environment in the area.

Brainstorm the stakeholders in this situation with students. Include positive and negative consequences and assign roles to students.

Examples: Mr. Walther, the mining company, miners, mayor, neighboring property owners, local unemployed workers, nearby apartment building owners who could rent to miners, local businesses and restaurants, homebuilders, the Environmental Protection Agency who are concerned about the wildlife that will be displaced and is worried about

waste products and possible pollution of the aquifer that is also on the Walther property, the state department of transportation, and local politicians (such as congressmen and governor). Assign roles to students who will prepare their viewpoints to be shared at a Town Meeting before Mr. Walther makes his final decision.

### Activity: Spreading the Word

As a culminating activity, students will work independently or with a partner to research a chosen local environmental issue.

**Objective:** Using the online site *Glogster.edu* students will develop “glogs” to teach about their researched topic. (A Glog is an interactive visual product in which students create a poster or web page containing multimedia elements including: text, audio, video, images, graphics, drawings, and data. It is a great way to integrate technology and create a polished interactive presentation!)

Suggested topics might include the Delaware Estuary, the consequences of being in a state that is home to several chemical companies, the plight of endangered species in our area, water pollution, energy sources and conservation, etc.

Glogs will be posted and shared with the school community through presentations to audiences of students, staff and community members.

After the conclusion of this unit, students will have the option of joining the “Eco-Ranger” Club at my school. This group will meet at lunch, recess and/or after school to continue the journey of learning about and caring for our environment. They will become the major caretakers of our school butterfly garden and will welcome guest speakers on various ecological topics.

### Content Standards

The new Common Core standards demonstrate a definite shift toward the instructional use of more informational texts that contain data and content specific information. It requires students to build knowledge from multiple sources and to be able to cite evidence to support a position. The activities in this unit have been designed to provide students with opportunities to construct arguments in conversation and writing,

responding to a variety of texts. Academic vocabulary will be developed and used in all activities.

Therefore the unit is cross-curricular, addressing standards in English Language Arts, Social Studies, Science and Technology. The outcomes include critical thinking, global and community involvement, awareness of one's own worldview, and making connections between personal experience and research.

Specifically, the following Reading standards will be addressed from the Common Core:

1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. **CC5RI1**
2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text. **CC5RI2**
3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text. **CC5RI3**
4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. **CC5RI4**
5. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/ solution) of events, ideas, concepts, or information in two or more texts. **CC5RI5**
6. Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent. **CC5RI6**
7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. **CC5RI7**
8. Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). **CC5RI8**
9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. **CC5RI9**
10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently. **CC5RI10**

### **Writing**

Students will:

Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

- a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.
- b. Provide logically ordered reasons that are supported by facts and details.

- c. Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).
- d. Provide a concluding statement or section related to the opinion presented

**Speaking and Listening:**

Students will:

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- b. Follow agreed-upon rules for discussions and carry out assigned roles.
- c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

**Comprehension and Collaboration:**

Students will:

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- b. Follow agreed-upon rules for discussions and carry out assigned roles.
- c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions

**Teacher Resources**

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### **Suggested Literature with Environmental Themes**

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**Curriculum Unit Title**

Making a Difference: Every Action Matters

**Author**

Nancy Ventresca

**KEY LEARNING, ENDURING UNDERSTANDING, ETC.**

Modern devices and materials, designed to make our lives more comfortable, can have negative consequences for our natural environment.

We share our environment with other living things and depend on them to survive. Therefore we need to take care not to damage our natural environment.

**ESSENTIAL QUESTION(S) for the UNIT**

What is the impact of human activities on the natural environment?

What can be done to minimize and/or repair the damage already created by our modern world?

**CONCEPT A**

**CONCEPT B**

**CONCEPT C**

Authors often write stories that illustrate real problems

Environmental decisions affect the entire ecosystem.

Shared information can result in positive change

**ESSENTIAL QUESTIONS A**

**ESSENTIAL QUESTIONS B**

**ESSENTIAL QUESTIONS C**

- How do authors of fiction make people aware of real life problems?
- How do the habits of humans impact the natural environment?

- What is important when making environmental decisions?
- How can human plans be made that take environmental consequences into account?

How can human behavior be changed to minimize or repair damage done to our environment?

What are the greatest environmental challenges to our local area?

**VOCABULARY A**

**VOCABULARY A**

**VOCABULARY A**

Theme, harvester, republic, pedicycle, hover-carriers, environmentalists, propaganda, aquifer, dystopian

Consumers, industrialization, natural resource, non-renewable resource, pollutant

Estuary, fracking, ecosystem, renewable/non-renewable resource, technology, civil engineering, urban sprawl, global warming

**ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES**

“Water Wars” by Cameron Stracher (novel)

“The Power of Water” National Geographic video

<http://edu.glogster.com>

## Notes

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<sup>i</sup> Robinson, Ken, and Lou Aronica. *The element: how finding your passion changes everything*. New York: Viking, 2009. Print.

<sup>ii</sup> Gardner, Howard. *Frames of mind: the theory of multiple intelligences*. New York: Basic Books, 1983.

<sup>iii</sup> Goleman, Daniel. *Emotional intelligence*. Bantam 10th anniversary hardcover ed. New York: Bantam Books, 2006. Print.

<sup>iv</sup> Ibid.

<sup>v</sup> Ibid.

<sup>vi</sup> Comprehensive conservation and management plan for the DE Estuary

<sup>vii</sup> Deaton, Cynthia C. M., and Cook Michelle. "Using Role play and case study to promote student research on environmental science."