

## **PA Chesapeake Bay Meaningful Watershed Educational Experience 2009 Grant Program for Conservation District – School Partnerships**

*Funding provided through the Federal NOAA B-WET Program*

### **Project Update: July 1, 2009 – December 30, 2009**

**Eleven projects were completed during this period** (final reports start on page 2)

- MWEE0909 Environmental Impacts Field Study - Dauphin Conservation District partnered with Londonderry School in Susquehanna School District
- MWEE0910 Watershed Festival - Huntingdon Conservation District partnered with Southside Elementary School in Huntingdon School District
- MWEE0911 Watersheds, the Water Cycle, and Aquatic Life – Lackawanna Conservation District partnered with Mayfield Elementary in Lakeland School District
- MWEE0912 Human Impacts on Watersheds - Lancaster Conservation District partnered with Clay Elementary in Ephrata School District
- MWEE0917/18/19 Outdoor Learning Lab Experience 1, 2 and 3 - Snyder Conservation District with Middleburg, West Perry, and West Snyder Schools in Midd-West School District
- MWEE0920 AMD Field Project - Sullivan Conservation District with Sullivan County High School in Sullivan School District
- MWEE0921 Stream Environment Field Experience - Wyoming Conservation District partnered with Lackawanna Trail Elementary in Lackawanna School District
- MWEE0922 Integrated Environmental Learning - York Conservation District partnered with Central York High School in Central York School District
- MWEE0923 Wetland Restoration and Preservation - York Conservation District with Spring Grove Area High School in Spring Grove School District

**Ten other projects are in progress** and will be completed by 4/30/2010 (summaries start on page 16)

- MWEE0901 Make a Splash – Bradford Conservation District is partnering with Towanda & Wyalusing School Districts' Towanda Area Elementary and Wyalusing Area Elementary Schools
- MWEE0902 Trout in the Classroom – Bradford Conservation District is partnering with Troy School District's Troy Area High School
- MWEE0903 Contributory Systems of the Bay – Cambria Conservation District is partnering with Cambria Heights School District's Cambria Heights Middle School
- MWEE0904 Stream Monitoring - Cameron Conservation District is partnering with Cameron County School District's Cameron County High School
- MWEE0905 Pond Habitat Study & Restoration - Centre Conservation District is partnering with Bald Eagle School District's Bald Eagle High School, Middle School, and Elementary Schools
- MWEE0906 Briar Creek Restoration & Festival - Columbia Conservation District is partnering with Berwick School District's Berwick Middle School
- MWEE0907 Fishing Creek BMPs for Stream Improvement & Fair - Columbia Conservation District is partnering with Central Columbia School District's Bloomsburg Christian School

- MWEE0908 Mud Run BMPs for Stream Improvement - Columbia School District is partnering with Millville School District's Greenwood Friends School
- MWEE0916 Limestone Run Case Study - Northumberland Conservation District is partnering with Milton School District's Milton Area High School
- MWEE0924 Focus on Floodplains - Perry Conservation District is partnering with Newport School District's Newport School

**Twelve new projects will be initiated in January 2010** and completed by 6/30/2010:

- Adams Conservation District is partnering with Fairfield Area School District's Fairfield Area High School
- Bradford Conservation District is partnering with Troy Area School District's Elementary School East and Athens, Canton, Northeast and Troy High Schools
- Cumberland Conservation District is partnering with West Shore School District's Cedar Cliff High School
- Dauphin Conservation District Central Dauphin School District's Circle School
- Lancaster Conservation District is partnering with Ephrata Area School District's Clay Elementary
- Lebanon Conservation District is partnering with Annville-Cleona, Cornwall-Lebanon, Eastern Lebanon County, Lebanon and Palmyra School District elementary schools
- Snyder Conservation District is partnering with Selinsgrove Area Intermediate School
- Wyoming Conservation District is partnering with Tunkhannock Area School District's Evans Fall Elementary
- York Conservation District is partnering with Red Lion Area, Spring Grove Area, and York City School Districts' Central York, Spring Grove Area and William Penn High Schools

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### Final Reports for Completed Projects:

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**Project Title:** MWEE0909 Environmental Impacts Field Study

**Funding:** \$2000

**Conservation District:** Dauphin

**School District:** Susquehanna

**School:** Londonderry

**Summary:** The 7<sup>th</sup>/8<sup>th</sup> grade student curriculum is based on the Environment and Ecology standards for the state of Pennsylvania. The course is primarily hands-on and relies heavily on outdoor experiences that connect to classroom instruction. The final field study for this year took place at the Karen Noonan Center in Crocheron, MD.

**Students:**

How many students in which grades were targeted through this project? 7 eighth grade students and 8 seventh grade students.

**What percentage of each grade's total student body do these numbers represent?** 100% of the entire 7<sup>th</sup> and 8<sup>th</sup> grades at Londonderry.



**Project Overview:**

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

Students were given a challenge to see how many plants and organisms they could identify in their three days on the bay. This provided students with the opportunity to learn how to better use identification keys as well as provided them with incentive to really be aware of everything around them. Once students accurately identified a plant or organism it was recorded on the "Critter Count" board. This board was continually added to during the trip and provided a means for assessment of identification of species.

Another ongoing challenge addressed conservation of resources. The "Tide Island Challenge" had students working on how well they could conserve water and electricity and how well they could reduce waste.

Students were given the responsibility of rotating through positions that put them in charge of inspecting dinner plates and cups for waste.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

In an effort to prepare students for the trip classroom instruction time was spent learning about aquatic biomes. Students were assigned reading materials as well as review worksheets to be sure they had enough background knowledge to get the most from the field study. The students completed an activity designed by the American Meteorological Society called, "Surf Your Watershed." This online activity used the Environmental Protection Agency's website to introduce the concept of watersheds and what watersheds students in Harrisburg, PA are a part of. It was a revelation to some students to realize just how many of our actions can impact numerous watersheds.

This is an end of the year program; therefore, post classroom activities will take place in the fall. Students will continue with the environmental education curriculum but will be asked to connect text book concepts with real life applications observed during the field trip.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

One of the first activities involved orienting the students as to where they were in reference to the Bay and where the Susquehanna flowed into the Bay. Students were surprised to learn that the Susquehanna River is the largest contributor of fresh water to the Bay. This really helped impress upon the students the importance of their daily living actions. We discussed pollutants and over-fertilization issues that pose a problem for the Bay.

**2c. How were the classroom activities integrated into the school's curriculum?**

**This program was integrated into the school curriculum by offering it as an the "summary trip" for an entire year's worth of environmental study. Londonderry School prides itself on helping their students to become aware of their impact on the environment. This trip showed students the real life consequences of a community's actions.**

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

Upon arrival to the Karen Noonan Center CBF staff greeted us. It is evident from the moment you exit your car **that the program is well thought out. Students were immersed into "island time" and were told that we would eat when we were hungry and sleep when we were tired.** We were asked to surrender all watches and electronic devices so that we were not distracted by them. Then, we were instructed where to place our things and given a meeting point to begin discussion about the facility, safety rules, and overall guidelines for the trip. The staff at the center consisted of two counselors, both with training in environmental education. They presented themselves as very knowledgeable individuals who had a true love of the Bay.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

The project involved the Chesapeake Bay Foundation, Londonderry, and the Dauphin County Conservation District.

5. In what ways might it be possible to measure long-term outcomes of the project?

The most feasible way to measure long-term outcomes of this project would be through sending out surveys and noting the impact the trip had on everyday living. This could be done through alumni mailings to students **who participated. In the past I've had a parent e-mail me stating that her daughter was asked to write an essay about her favorite trip.** She talked about the Chesapeake Bay trip because it provided her with a sense of awareness of her environment, while at the same time helped with team building activities. I would highly recommend this program to other teachers.

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**Project Title:** MWEE0910 Watershed Festival

**Funding:** \$1000

**Conservation District:** Huntingdon

**School District:** Huntingdon

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

Watershed festivals were implemented for the entire 5<sup>th</sup> grade at Southside Elementary. Students rotated through three stations: watersheds with the Enviroscape model, macroinvertebrate identification and water quality index calculation, and fish printing with PA native fish.

For the watersheds station, the Juniata Clean Water Partnership provided staff to operate the Enviroscape model. Students learned how land activities affect local waterways and various sources of pollution. Watershed maps were used to show small local streams connecting with the Juniata River, Susquehanna River, and finally the Chesapeake Bay. The watershed address concept was reiterated during the fish printing station. Students brainstormed sources of pollution and learned how to reduce them at home.

For the macroinvertebrate station, real specimens from two streams were brought to the classroom for identification. Students learned how the abundance and type of macros was a good indicator of stream health and water quality. The students were charged with the task of determining water quality of the two streams using their identifications.

In the fish printing station, students used models made from real fish to create a print from craft paint and cloth. High quality illustrations of each fish species were obtained from the PA Fish and Boat Commission website and laminated for student use. They learned about fish coloration and camouflage and then used the illustrations to make their fish prints. Facts about each fish were incorporated in the lesson, such as habitat type (i.e. lentic or lotic) and local habitat (i.e. Juniata River or Raytown Lake), and sensitivity to pollution and riparian disturbance (especially Brook Trout). **Students also learned about the Conservation District's role in protecting our land and water to preserve these resources for future enjoyment.**

The goals of the project were exceeded as the water festival program was also implemented at Juniata Valley Elementary schools, where the entire 4<sup>th</sup> and 5<sup>th</sup> grade was targeted (about 120 students). The fish printing session was implemented at the River Arts Festival at the Trestle at Portstown Park in Huntingdon.

### **Students:**

How many students in which grades were targeted through this project? Southside: 60 5<sup>th</sup> grade students; Juniata Valley – 120 4<sup>th</sup> and 5<sup>th</sup> grade students

**What percentage of each grade's total student** body do these numbers represent? 100%

### **Project Overview:**

1. In what ways did the project include hands-**on watershed activities that strengthen a student's connection with** the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

The fish printing and macroinvertebrate identification were hands-on activities that allowed students to connect with concepts of water quality by studying what aquatic life needs to survive. The students were challenged to compare water quality of two streams based on the macroinvertebrates they identified. The Enviroscape session provided a lesson in individual stewardship as the program emphasized how land activities here at home can affect local waterways and that local waterways connect to larger waterways. Also, students learned their watershed address by using maps to see how their local creek drains into larger river systems, and how water here eventually leads to the Chesapeake Bay.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

The pre- **evaluation of students' knowledge** of fish and macroinvertebrates included verbally asking the group to identify fish or macro specimens. Before the water festival, some students knew the fish species and a few knew the mayfly. The post-water festival activity was administered by their classroom teachers, and students made posters with drawings and words to describe what they learned. Many students made detailed drawings of the macroinvertebrates they learned and noted their connection to pollution (see Appendix A). Other posters depicted the students pledge to reduce pollution and litter around their homes and around Huntingdon after the Enviroscape model showed them how water becomes polluted. After the water festival, the fish quiz revealed

that most students could identify the fish species covered (see Appendix B). For the 42 fish quizzes taken, only 5 students misidentified the brook trout. All but 6 students recognized the northern pike and that it is not native to Huntingdon County. Only 3 students missed the question about camouflage. One third of the students missed the perch question, but it was generally missed by students who printed another fish species. I learned from the assessment that I should talk a bit more about the yellow perch, and in particular demonstrate how its mouth and striped pattern are different than the largemouth bass.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

In the Enviroscope session, students learned how land activities affect local streams and how local streams connect with Chesapeake in the watershed address study. Watershed address was reiterated in the fish printing session.

**2c. How were the classroom activities integrated into the school's curriculum?**

Both schools asked for similar program again next year to supplement their science curriculum. The teachers were appreciative of the assistance the Conservation District provided at no cost to the school.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

All presenters were either Conservation District staff or personnel associated with the Conservation District such as Americorps and Juniata Clean Water Partnership staff. The programming content was designed by conservation district staff in Blair and Huntingdon Counties.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

Partnerships were utilized in order to present the multiple stations in a single day, including personnel from the Blair County Conservation District, their Americorps person, and the Juniata Clean Water Partnership.

5. In what ways might it be possible to measure long-term outcomes of the project?

To measure the long-term outcomes of the water festival project, the 6<sup>th</sup> grade teachers could provide feedback **about their incoming classes and whether students' understanding of watersheds has improved over the years** since the implementation of the water festivals for 5<sup>th</sup> graders.

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**Project Title:** MWEE0911 Watersheds, the Water Cycle, & Aquatic Life      **Funding:** \$1639

**Conservation District:** Lackawanna

**School District:** Lakeland

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

LCCD set out to educate the 4<sup>th</sup> grade of Mayfield Elementary about their local watershed and the effect of acid mine drainage pollution. In total, four 1.5 hour educational sessions were held and activities included and **Enviroscope demonstration, the "Downstream activity" in which students were given waterfront property and had to decide how to develop it**, Acid mine drainage information session followed by AMD tie dye T-shirt activity, a field trip to an abandoned mine drainage site and chemical water testing, a field session in the Lackawanna River behind their school with chemical water testing and macroinvertebrate identification, and a watershed festival with Water Olympics, fish printing, acid mine drainage chalk creation, vermicomposting and aquatic food web activity.

One of the strengths of this project was having a very strong lead teacher and a supportive principal. We were able to use various classrooms, the gym, materials, etc. whenever we needed. The teacher made sure that students were well behaved and listening during presentations. She utilized the journals we created to keep the students interested between educational sessions and she encouraged them to think across the curriculum into other areas such as art, math and history.

LCCD is hoping to continue this very successful program in the future utilizing high school students interested in the environment and planning service projects as project leaders and organizers. I believe that the time frame in which this is conducted (early fall) well suited for both the school and the conservation district.

## **Students:**

How many students in which grades were targeted through this project? 54 in fourth grade; 47 in fifth grade

**What percentage of each grade's total student body** do these numbers represent? : 100% of fourth grade; 100% of fifth grade

## **Project Overview:**

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

Each of the project's four sessions included hands-on components. Students participated in an Enviroscope demonstration and the "We All Live Downstream" coloring activity to learn about the components of their watershed, including their local river and its eventual connection to the Chesapeake Bay, and how their own actions contribute to the health and pollution of the watershed. After learning about acid mine drainage pollution, they used locally collected iron oxide to tie-dye t-shirts, seeing for themselves how the polluting substance can be recycled.

They made connections to their local streams by taking field trips to the river behind the school's property to collect macroinvertebrates and to an acid mine drainage site downstream. They did chemical tests to make comparisons between the two sites. Students had no idea that acid mine drainage existed in their community and were surprised by the color and smell of the water.

The final session was a water festival where the students acted out food webs, handled composting worms, made chalk of iron oxide, and played games that demonstrated the characteristics of water. They also got to see live reptiles.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

The students were administered a short pre- and post-questionnaire to evaluate if they had learned some of the basic concepts of water, watersheds, aquatic organisms, and acid mine drainage. The average school on the pretest was 3 out of 7 questions answered correctly. They showed significant increase in knowledge on the post test with the average score of 6 out of 7 answered correctly. Throughout the program, they kept journals where they reflected on what they learned and could include photos or drawings of what they saw. They also wrote a final paper explaining their own creative approach to cleaning up acid mine drainage.

- 2b. **In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

Through these activities, students reviewed the topics covered in the program, including local aquatic life, pollution, and how the Lackawanna River watershed fits within the Bay watershed. Their final paper required additional research into the nearby mine drainage problems. The journal writing encouraged students to make personal connections to the watershed and to also make the program memorable.

- 2c. **How were the classroom activities integrated into the school's curriculum?**

The fourth grade science curriculum already included an eight-week study of water following the Delta Education FOSS curriculum. The MWEE program activities were coordinated to fit within that eight-week period and provided real world experience with the concepts they were already learning (including the water cycle, bony fish, food chains) and also introduced new but related topics (such aquatic insects, acid mine drainage, watersheds, pH scale). The journals and final papers allowed students to synthesize all the information. The teachers are currently discussing how to continue this program and integrate it into next years curriculum.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

The project leaders and presenters were experienced educators and professionals. The program was led by Alana Roberts, the Lackawanna County Watershed Specialist, who regularly leads field trips and educational programs for students. Assisting her was Office of Surface Mining/VISTA volunteer Lindsey Ritchey, who spent the year working within the watershed and with education programs. Additional presenters during the program

included the conservation district manager, an educator from Lackawanna State Park, OSM/VISTA volunteers, and a Reptiland naturalist.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

During the watershed festival, other conservation district staff as well as the educator from Lackawanna State park and members of the OSM VISTA team for all across northeast PA assisted with stations. The children were able to meet many different resource professionals and ask about their jobs.

Many articles about this project appeared in the local paper, making the community aware of the education.

5. In what ways might it be possible to measure long-term outcomes of the project?

One goal of the program was to review topics covered on PSSA exams. One way to measure long term **outcomes would be to evaluate scores on the science portion of the PSSA fourth graders' exams.**

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**Project Title:** MWEE0912 Human Impacts on Watersheds

**Funding:** \$1709

**Conservation District:** Lancaster

**School District:** Ephrata

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

MWEE Field Experience was introduced in the classroom with four weeks of lessons following the Water Foss Kit.

MWEE Field Experience Project Activities –

1. Stream Study – Students completed a biotic study of the stream led by the Lancaster County Conservation District Education Coordinator, charting macroinvertebrates. They also completed a visual assessment of the stream emphasizing human impacts both positively and negatively.
2. Nature Name Tags – Utilizing all natural materials students created name tags.
3. Human Impact on Watersheds – Following the instruction of the school LEAP teacher and her students, third graders created watersheds and impacted each model with pollutants and rain.
4. Macroinvertebrate Experience – In an open field students developed comprehension of the purpose and adaptations of various macroinvertebrates through a role play activity.
5. Edible Aquifer – Building on their understanding of groundwater, each student designed an aquifer with soil layers and collected water. The aquifer was edible and through the drinking process, a well pump was added along with pollution to illustrate the movement of groundwater.

**Students:**

How many students in which grades were targeted through this project? Third Grade, 93

What percentage of each grade's total student body do these numbers represent? 20%

**Project Overview:**

1. In what ways did the project include hands-**on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?**

Hands-on learning experiences were a part of every aspect of the field classroom. Activities included a stream study in Middle Creek, a nature name tag art project utilizing a variety of natural materials, and a watershed activity where students created a 3D watershed, applied potential pollutants, and rainwater. A macroinvertebrate experience had students playing the role of various macroinvertebrates which illustrated adaptations and stresses from the environment. Students also created a 3D working aquifer with a well to visualize groundwater movement. Each instructor stressed the human impact students experienced through the hands-on activity.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

- a. Students were introduced to the watershed concept in second grade using the enviroscape watershed model, touring a waste water treatment plant, and learning the water cycle.
- b. As the watershed unit began in third grade, students completed classroom anticipation introduction activities as a pre-test.
- c. Following the field learning experience and classroom lessons, students completed the Foss Kit Water Test which included questions pertaining to the field experience. Students also wrote thank you letters as a journal writing sample and completed posters about water quality.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

- a. During the stream study, students stated their watershed address including: local – Middle Creek, state – Susquehanna River, regional – Chesapeake Bay, and global – Atlantic Ocean.
- b. Students recognized human impacts in Lancaster County such as thermal warming, vehicle oil leaks, lawn fertilizers, pesticides, and snow removal salt influence the water quality of the Chesapeake Bay.

**2c. How were the classroom activities integrated into the school's curriculum?**

The water unit is normally presented in the final quarter of the school year. The third grade curriculum includes the use of the Water Foss Kit. To increase hands-on learning, and expand the watershed curriculum, the third grade teachers met in consultation with the school principal and the Lancaster County Conservation District Education Coordinator. During the meetings, this team developed the field learning experiences, preparation lessons for the trip, and connections to the Water Foss Kit objectives.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

Yes, each third grade teacher provided in the classroom instruction as well as in the field. Additional instruction during the field learning experiences included the Lancaster County Conservation District Education Coordinator, and the Clay Elementary LEAP (gifted) teacher.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

The MWEE grant support allowed the field learning experiences to take place in the school community on a local **farm. The project also included the school's LEAP teacher and her older students to present the watershed impact lesson.** The Lancaster County Conservation District (LCCD) Education Coordinator partnered on the project as well.

5. In what ways might it be possible to measure long-term outcomes of the project?

Long term outcomes are always a challenge with education. Informally, several students attended a public stream study led by the LCCD Education Coordinator. These students were able to identify macroinvertebrates several weeks following the field learning experience. Also students will complete the fourth grade PSSA tests which may contain questions relating to the Watershed Environment and Ecology Standard.

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**Project Title:** MWEE0917/18/19 Outdoor Learning Lab Experience 1, 2, 3

**Funding:** \$6393.50

**Conservation District:** Snyder

**School District:** Mid-West Middleburg(1), West Perry(2), West Snyder(3)

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

The Outdoor Ed experience is a three day trip for fifth grade students in the Mid-West Schools District where the students are housed in cabins at Camp Mt Luther and are exposed to a variety of outdoor and environmental activities. In particular consideration to a watershed experience, the students were introduced to a number of activities by various partners on the second day; such as the Snyder County Conservation District who uses the **enviroscape to explain "what is a watershed", and introduces the concept of non-point source pollution**, as well as Freddy the fish who travels downstream and is subject to pollution, another valuable introduction into watersheds is

Mike Bilger from Ecoanalysts who leads the students in stream study, and collects macroinvertebrates, and i.d.'s fish, reptiles, and amphibians in an on site stream.

### **Students:**

How many students in which grades were targeted through this project?

West Middleburg: Eighty one fifth grade students attended the activity

West Perry: Thirty one fifth grade students attended the activity

West Snyder: Fifty one students attended the activity

What percentage of each grade's total student body do these numbers represent?

West Middleburg: 100%

West Perry: 96%

West Snyder: 100%

### **Project Overview:**

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

The students were involved in a variety of activities reinforcing the definition and function of watersheds, specifically the Chesapeake Watershed. While at Camp Mt. Luther, students watched as plastic "Freddie the Fish" was polluted by a conglomeration of different household, industrial, and agricultural chemicals. A discussion was then led about the environmentally safe way to deal with those pollutants. Students were also shown an Enviroscope that covered both point and non-point pollution, and things that can be done to prevent those types of pollution. Students were given several scenarios where they had to make choices that met fiscal and responsible watershed management. During stream study, students were introduced to different types of equipment used to test for stream water quality.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

Before leaving for Outdoor Education, students were given a pretest. Their average score was 46%. Upon returning, students scored 84% on the same test. A copy of the pre and post test is included.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

Our students have a natural interest in the streams and creeks on the western end of the county. They are also very fascinated by the Susquehanna River since many students spend time camping, fishing, canoeing, and kayaking this amazing river during the spring and summer months. Students had a deeper appreciation of the river and the way they could impact these creeks, streams, and rivers in the future. They took ownership of what could happen in the future.

**2c. How were the classroom activities integrated into the school's curriculum?**

In the classroom, 5<sup>th</sup> grade students in our district complete the STC science kit Ecosystems as part of our science curriculum for one marking period. Students are asked to make and maintain a ecocolumn, read science stories about pollution and environmentally friendly practices. Students also have a 20 minute movie that specifically discusses the Chesapeake River Bay and the impact the neighboring states have "upstream."

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

At Outdoor Education, students are led by experts including district teachers and staff from the Snyder County Water Conservation District. In addition, Mr. Mike Bilger worked for DER for 30+ years before recently retiring.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

Other representatives teaching stations at Camp Mt. Luther were representatives from the PA Department of Conservation and Natural Resources, retired teachers from our district teaching canoeing and nature trail, Mrs. Betty Klingler at Outdoor Cooking Skills, and Dr. Eyster, author and survival guide specialist.

5. In what ways might it be possible to measure long-term outcomes of the project?

In the case of our district, we continue with our STC Ecosystems kit during our science classes. These weekly discussions within the science class will give us a chance to monitor and reinforce conservation topics.

On Earth Day every year, students participate in a variety of Earth friendly activities including planting trees (DCNR) and Victory Gardens, and participating in power point presentations from the Snyder County Water Conservation District.

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**Project Title:** MWEE0920 AMD Field Project

**Funding:** \$1689

**Conservation District:** Sullivan

**School District:** Sullivan



**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

Preparation Phase:

The project involved the entire eighth grade class meeting **in the school's auditorium where we, the district,** provided a 2.5 hour presentation on the history of coal mining in the county. Topics included in the program were: how coal was removed, underground and surface mining, the activities of mining towns, the abandoning of coal mines, the hazards of abandoned coal mining land, reclamation and treatment, and effects on the Loyalsock Creek and the immense impact of acid mine drainage to the West Branch Susquehanna and Chesapeake Bay. Students were also instructed on the work to be accomplished as part of the field trip including, data collection, and sampling procedures.

Additional instruction and review of planned field study occurred through the regular science class time.

Action Phase:

This phase included a field study trip to abandoned mine lands where students saw first-hand an AMD treatment system, collected hands-on data for pre and post treatment, explored reclaimed mine land where biosolids applications have returned vegetation to **a previous waste land, and did "stream stomping" in the receiving stream** of the treated AMD. In the stream, students collected chemical data and sampled aquatic life to use in determining water quality.

Refection Phase:

A review of what was accomplished, discussion of data obtained, and instruction for the completion of student reports occurred during this phase. An extensive question and answer session was also part of this. Students worked with their team members to analyze data, draw conclusions, answer questions, and develop reports.

A presentation was developed and presented to both the School Board and Conservation District Board which highlighted the success of the project and a request for continued support for future years. Students that participated in the project spoke to the board members and shared their knowledge of environmental impacts and treatment to local streams in the Chesapeake Bay watershed.

We feel our main goal of raising student awareness of local water quality issues and how agencies are working to address them has been achieved. Students were able to gain a history lesson that focused on the county they live in and also became aware of environmental concerns and cleanup that is occurring literally in their backyards. The students also learned about practices that can treat water pollution sources and improve the water quality of our streams and the Chesapeake Bay.

One of the biggest challenges was the number of students at one time during the field studies. It was evident that too many students were left waiting to do various activities. A solution for future years is to do two separate field study trips and therefore deal with half the students at a time.

Another change that will be made is increased education to students on the use of water testing instruments so that they have a clearer understanding of how they work, and what the purpose is for each test prior to actually doing the testing. Additional education in identifying macro invertebrates will be another goal prior to field studies.

### **Students:**

How many students in which grades were targeted through this project? 52 eighth grade students participated in the project. 49 of them were able to participate in the field studies.

**What percentage of each grade's total student body do these numbers represent?** 100% of the 8<sup>th</sup> grade.

### **Project Overview:**

1. In what ways did the project include hands-**on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?**

Hands-on watershed activities included the chemical testing of pre and post treated acid mine drainage at an AMD anoxic limestone treatment system. The students also tested soil pH on abandoned mine land and reclaimed mine land that has undergone biosolids treatment and re-vegetation. Students replicated chemical sampling in the receiving stream (Birch Creek) of the AMD treatment and collected and identified macro invertebrates through standard collection procedures for the purpose of evaluating stream water quality.

2. **2a. Please describe the project's pre and post classroom activities/evaluations:**

Conservation District staff met with the students and provided a history lesson focusing on coal mining in the watershed, how **coal was mined, effects of mining on a stream's water quality, and practices used to restore** abandoned mine land and treatment of acid mine drainage. The students were also briefed on what studies they were to do in the field exercises and what was expected in regards of reports. The students also began journals and wrote of their expectations. Another neat aspect was that the teacher and several students provided a program to the school board on the success of the project and interest in making it an annual part of the curriculum. Post activities/evaluations included students have three questions each answered, developing charts for interpreting data collected and developing individual reports on the projects that were graded by the teacher.

2b. In what **ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

**The focus allowed students to realize that issues effecting water quality exist in their "own backyards" and there are agencies and volunteer groups working to alleviate the impacts.** The students also learned that AMD is the largest non-point source impact on the West Branch of the Susquehanna River.

- 2c. **How were the classroom activities integrated into the school's curriculum?**

The whole project was formed around the schools curriculum as it took place during the study of fresh water resources including surface and ground water, balancing water needs, and fresh water pollution. Local watersheds including the Susquehanna River and Chesapeake Bay are tied into the teaching of this topic in a normal schedule. The MWEE project allowed for the curriculum to be enhanced and also allowed for students to achieve hands-on learning as part of this phase of their education.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

The project was coordinated and conducted by staff members of the Sullivan County Conservation District and Sullivan County School District. District Staff members work hand-in-hand with mine reclamation and AMD treatment construction and maintenance and included the districts primary technician and watershed specialist that led the stream analysis and water quality testing. The School teacher, Debbie Geist, was also part of the educational process and developed the lesson plans, evaluations, and other student requirements for the project. Additional assistance was provided by a junior high school student that has plans to pursue a career in fisheries.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

The community partners included in this project were the landowners, Lewis Lumber Company and White Ash Land Association, that granted permission to study their property and the efforts of Kyler Environmental on biosolids education.

5. In what ways might it be possible to measure long-term outcomes of the project?

Many students were curious to learn how the district staff got involved with this type of work and were also interested in the educational requirements of the jobs. As several of the students had a keen interest in the various field studies, it is possible to track their career paths to see if the project had an impact on their choices. Another long term outcome is that the teacher, Debbie Geist, plans to incorporate this into the annual curriculum for eighth grade and there is interest in tying in English class as a way of further addressing report writing and other requirements of the students.

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**Project Title:** MWEE0921 Stream Environment Field Experience    **Funding:** \$1000

**Conservation District:** Wyoming

**School District:** Lackawanna Trail

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

Laura had five stations for the kindergarten students to circulate through. The first station was an examination of the insects that live in water. This station was well equipped with bugs to look at as well as an interactive board showing the bugs. The next station was a look at animals and their habitats. Laura provided stuffed animals that live in the forest; she gave a brief explanation of the animals and allowed the children to place the animals in the environments. The third station was a fish print activity. Students were given different types of rubber fish, dipped them in paint and made stamps of them. This station was followed up with a book about fish. The fourth station was a nature walk through the park with a discussion about the trees and birds that live in the forest. The last station was a description of animals that live in the forest and a trail mix.

The program ran very smoothly and without complication. It was a beautiful day!

**Students:**

How many students in which grades were targeted through this project? There were 80 Kindergarten students who participated in this field trip.

What percentage of each grade's total student body do these numbers represent? 100%

**Project Overview:**

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

2 of the stations provided were based on local rivers and streams.

2. 2a. Please describe the project's pre and post classroom activities/evaluations:

The Kindergarten curriculum includes the forest, pond and insects. We spent the entire year preparing for his day. The day was considered a wrap up of the year. The concluded the field trip with class discussions in the classroom.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

Students were given a hands-on feel for the information they were learning about all year.

**2c. How were the classroom activities integrated into the school's curriculum?**

The Kindergarten curriculum is based on the material covered in all of the classroom activities.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

The presenters were well versed in the watershed experience. The water insect station provided great detail about the insects. The students asked difficult questions, and all were answered with great detail.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

We used the local park, which provided the stream as well as the walking path for the nature walk. The park also provided a pavilion for the fish prints. It provided a great environment for the habitat activity.

5. In what ways might it be possible to measure long-term outcomes of the project?

Students continue with the nature curriculum in first and second grade. It would be nice to begin the following year with an activity similar and see if the children can draw from earlier experience.

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**Project Title:** MWEE0922 Integrated Environmental Learning

**Funding:** \$1287

**Conservation District:** York

**School District:** Central York

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):

Protecting and preserving watersheds for their educational as well as environmental benefits is a key component in the Environmental Science curriculum in our district. It was our intent to incorporate real community-based learning opportunities for students across the discipline, by visiting and interacting with real water resources management facility operators (learning centers), what some considered problem areas which should be restored and protected.

The goals of the project were achieved when the Environmental Science students at the new high school visited three (3) local water resource management facilities in the Codorus Creek Watershed, including Glatfelter Inc., The York Water Company, and Springettsbury Wastewater Treatment Plant, making it an extension of the classroom.

**Student involvement started with research and discussions, based on Pennsylvania's Environment & Ecology** academic standards, about the Codorus Creek watershed in the classroom.

There were no significant roadblocks implementing the project. However, the scope was scaled back from six (6) facilities to three (3) due to logistical and time constraints.

One change I would consider for future similar projects is including more facilities and sending groups of students to specific facilities, and then having them report back to the whole group about their experiences.

**Students:**

How many students in which grades were targeted through this project? 54 Environmental Science students, grades 11 and 12, at the new high school

**What percentage of each grade's total student body do these numbers represent?** The percentage of grades 11 and 12 total student body numbers represents approximately 6.75%.

**Project Overview:**

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

The students interacted with professionals at each water management facility that they visited. The tours of Glatfelter Inc. and the Springettsury Township Wastewater Treatment Facility included visually seeing the wastewater entering the treatment facilities and the water after it was cleaned entering the Codorus Creek. They clearly saw their connection to the Codorus Creek while visiting the wastewater treatment facility, the facility that cleans the water from Central York High School. The York Water Company created an interactive presentation for our students demonstrating the importance of being stewards of the water resources available to them in York County. Water resource managers at each location provided evidence for the importance of managing our water resources wisely.

2. 2a. Please describe the project's pre and post classroom activities/evaluations:

Prior to the visitation day students spent several weeks studying the Codorus Creek Watershed and factors that influence the quality of water within the watershed. Students spent two days on the creek analyzing the physical, chemical, and biological properties of the creek. In addition, students worked in groups to research problem areas of the Chesapeake Bay and determine the causes of those problem areas. Each group presented their findings to the larger group. After the trip, classroom discussion centered around the importance of managing our water resources. Each student wrote in their journals their thoughts regarding what they had seen and heard on their visitation day. An exam on water and water quality issues ended our unit.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

I think the students now more clearly see how water issues and usage in York County directly impact the health of the Chesapeake Bay. I believe that they see how important water is to every facet of their lives and the importance of managing the resource wisely.

2c. How were the classroom activities integrated into the school's curriculum?

**Everything done in class must be linked to the school's environmental science curriculum and the state's curriculum for ecology and the environment.**

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

Three current science teachers from Central York High School and one student teacher chaperoned the students on their visitation day. In addition, Gary Peacock, York County's **watershed specialist traveled with the group of teachers and students.** At each facility, knowledgeable professionals led the students on tours and discussions of how their facility utilizes, manages, or cleans water.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

The community was directly involved in the visitation day. In fact, the entire visitation day involved the students going into the community and seeing firsthand how water is utilized, managed, and cleaned by members of their community. The visitation day made what we learned in class much more meaningful to the students.

5. In what ways might it be possible to measure long-term outcomes of the project?

It might be possible to poll students who were involved in the project after their first year in college. We could see if what they learned by being involved with the project has made any influence on them during their first year of college.

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**Project Title:** MWEE0923 Wetland Restoration and Preservation **Funding:** \$2599

**Conservation District:** York

**School District:** Spring Grove

**Summary** (What were your project activities? In what way were the goals of your project achieved? Were there roadblocks? What changes would you suggest for future similar projects?):



The project focus was restoration and preservation of wetland sites surrounding our new high school by students in Environmental Science. These areas are part of an outdoor learning environment where students apply their knowledge in a real and tangible setting.

**Students:**

How many students in which grades were targeted through this project? What percentage of **each grade's total student body do these numbers** represent?

11th grade students in Environmental Science (approximately 150 students, or 60%) and 12<sup>th</sup> grade students in Environmental Field Studies (approximately 24).

## Project Overview:

1. In what ways did the project include hands-on watershed activities that strengthen a student's connection with the PA portion of the Bay, their local rivers and streams, and instill a stewardship ethic?

Site surveying and mapping out designated wetland areas; erosion control and surface improvements for access areas; recovery of runoff into wetland areas; planting over 1,500 native wetland plants three sites; removal of invasive species; maintenance of sites.

2. **2a. Please describe the project's pre** and post classroom activities/evaluations:

Students conducted several field studies before the project began, documenting the fauna and flora present and identifying areas subject to erosion. Characteristics and benefits of wetland areas were studied, and problems linked to human activities and their impact on the Bay were identified. Lab activities testing soil and water quality were conducted before and after the project. Native and invasive plants were researched using Field Guides and the internet.

**2b. In what ways did those activities expand a student's knowledge of the PA portion of the Chesapeake Bay watershed and its rivers and streams?**

Students saw firsthand the filtering capacity a functioning wetland has and how it can reduce sediment and pollution flow to the Bay. Students also learned about stream order and the connection of local streams to the Susquehanna River and ultimately the Bay. Students came to understand the value even a small, functioning wetland has and became advocates of conservation.

**2c. How were the classroom activities integrated into the school's curriculum?**

Activities on water pollution were tied to the wetland sites and examples of point and nonpoint were identified. Social science was integrated with soil test kits, and biome research was tied to the wetland with identification of characteristics and benefits. Succession was modeled as the project progressed, and food webs were also identified.

3. Was the project led by knowledgeable teachers, educators, and/or organizations familiar with providing meaningful Chesapeake Bay watershed experiences? Please describe:

Staff members at SGAHS included Celeste Barnes and Kim Richard, both Environmental Science teachers. Wetland design and native plants were provided through Environmental Concern in St. Michael, MD. **Sarah Toman is Environmental Concern's leading wetland educator and was instrumental in the success of this project.** Gary Peacock of the York County Conservation District offered expertise with numerous site visits and consultations.

4. Did the project involve the community or other partners that expand the influence of the project? If yes, please explain.

**Locally, Kennie's Market contributed \$1000 for the wetland project through our district's mini-grant program.** This money was used to purchase tools to establish the wetland sites and will be used to maintain the sites by students. H&H Contractors donated their time and equipment for initial excavation and the donation of stone and mulch for the access areas. York Building Products donated the materials to build a retaining wall at the back of the key site and local mason Russell Neiderer built the wall for a nominal fee.

5. In what ways might it be possible to measure long-term outcomes of the project?

Continued use and interest in the wetland sites by numerous students and teachers will insure ongoing success of this project. These areas have become popular outdoor learning areas beyond the science classes involved. Students have also become personally vested in the success of these project sites and are very proud of their accomplishments. Graduating seniors announced that they will be keeping tabs on the progress of the plants, and dozens of juniors signed up for the honors-level Environmental II course to continue their involvement with the project. The word is out k- it is cool to work outside, get dirty, and protect the environment in ways many **adults still don't understand**. This is our next generation of conservationists.

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**Projects in Progress:**

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**Project Title:** Make a Splash**Funding:** \$2000**Conservation District:** Bradford**School District:** Towanda & Wyalusing

The Bradford County Conservation District will host 2 "Make A Splash" (Aquatic Field Days) for Towanda Area Elementary School – 5th grade and Wyalusing Area Elementary School – 4th grade. The events will be held at the French Azilum Historic Site located on the banks of the Susquehanna River. A total of 224 students and 10 teachers will participate in the Field Days.

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**Project Title:** Trout in the Classroom**Funding:** \$2460**Conservation District:** Bradford**School District:** Troy

Trout in the Classroom brings field experiences indoors. Additionally, outdoor field experiences (biological, physical, and chemical water quality analysis, and watershed-related instruction) take place in and along creeks and tributaries within walking distance from the participating school. Teachers and sponsors will facilitate the lessons and activities to 9th through 12th grade students who participate in activities linked to water testing, fisheries and nutrient management (via land use judging, Envirothon, Nutrient Management Planning Competition, Conservation Field Days, and classroom instruction).

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**Project Title:** Contributory Systems of the Bay**Funding:** \$2500**Conservation District:** Cambria**School District:** Cambria Heights

Students will take a field trip to Prince Gallitzin State Park, where they will test and observe the streams, wetlands, and other aquatic areas for chemicals/bacteria/materials that were a product of human existence. Students will also study the aquatic habitats, examining plants and animals in the Park. Students will have the opportunity to visit the Seldom Seen Tourist Coal Mine. They will examine an array of resources including mining structures and original equipment, participating in an underground tour, which will enable them to fully understand the cause and effects of mining on the local watersheds. All students in the 6th grade will participate (98 students).

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**Project Title:** Stream Monitoring**Funding:** \$2500**Conservation District:** Cameron**School District:** Cameron County

Sophomore, Junior and Senior Biology and Ecology students will explore the stream that runs adjacent to the school (Wheaton Hollow, tributary to the Driftwood Branch of the Sinnemahoning) and the students will perform leaf bag, kick-net and chemical monitoring as part of their Aquatics Ecology curriculum. The purchase of tests bottles, kick nets and monitoring kits, as well as educational materials, will enhance their understanding of the principles.

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**Project Title:** Pond Habitat Study & Restoration**Funding:** \$2500**Conservation District:** Centre**School District:** Bald Eagle

The project will include the restoration of an existing pond (2/3 acre) that is located on the grounds of the Bald Eagle Area High School on route 220 in Wingate. In addition to the pond habitat restoration, we plan to purchase equipment that will be used by multiple grade levels for pond study experiences. For the fall of 2009, the district is targeting grade 4 students (160 students) and teachers (9) to implement the planned supplemental curriculum at the elementary level. The science committee has already created the lesson plans for grade 4 and they are now working on lesson plans for grades 1-6. It is hopeful that by the spring of 2010 that the rest of the elementary program (grades K,1,2,3,5 and 6 with approximately 800 more students) would be scheduled for the pond experiences. At the middle and high school levels, the environmental science classes and the Envirothon and Fishing Clubs will be targeted for implementation in the fall of 2009. The task force members from the high school will work with the building principals and the science department to transition more of the current science curriculum to the outdoor education site by the spring of 2010.

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**Project Title:** Briar Creek Restoration & Festival

**Funding:** \$2200

**Conservation District:** Columbia

**School District:** Berwick

Berwick Middle School students (grade 8) will participate field trips to study and appreciate the Briar Creek Watershed. They will accomplish a habitat restoration project at Briar Creek Lake. They will also design and deliver a watershed festival to Berwick elementary school.

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**Project Title:** Fishing Creek BMPs for Stream Improvement

**Funding:** \$2200

**Conservation District:** Columbia

**School District:** Central Columbia

Bloomsburg Christian School students (grades 6-12) will become intimately **familiar with their schools' watershed-**Fishing Creek (especially with streams listed by PA DEP on the 303(d) list of impaired waters). They will participate in field assessments to identify causes of impairment and they will work as a team to propose solutions that will lead to removal from the 303(d) list. Through community outreach, the students will facilitate 1-3 best management practices to improve land use and water quality. They will also provide a watershed fair to elementary students.

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**Project Title:** Mud Run BMPs for Stream Improvement

**Funding:** \$2200

**Conservation District:** Columbia

**School District:** Millville

Greenwood Friends School students (grades 5-8) **will become intimately familiar with their schools' watershed-**Mud Run (listed by PA DEP on the 303(d) list of impaired waters). They will participate in field assessments to identify causes of impairment and they will work as a team to propose solutions that will lead to removal from the 303(d) list. Through community outreach, the students will facilitate 1-3 best management practices to improve land use and water quality.

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**Project Title:** Limestone Run Case Study

**Funding:** \$2494

**Conservation District:** Northumberland

**School District:** Milton

The Meaningful Bay Experience/Habitat Restoration Project at Milton Area High School will focus on student achievement of the Pennsylvania Environment and Ecology Standards using Limestone Run as a case study and laboratory for hands-on learning, inquiry-based learning and problem-based learning. Students will participate in four days of water testing on the Limestone Run in which chemical, physical, and biological assessments will be performed. Also, students will attend a tour of the Stroud Water Research Center viewing a research facility dedicated to the study of streams and rivers, showing how water analysis studies and results can be used to promote a better understanding and thus improved use and care of this natural resource. Students in grades 11 and 12 will participate in this project.

