

Pittsburgh's Rivers and Their Impact on
Life in the Region

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Overview

The purpose of this unit is to explore with the children the topic of Pittsburgh's rivers and their impact on life in the region. As with familiar landforms and landmarks that people pass by and over, most residents of the city and its environs do not possess an extensive knowledge of the rivers and their importance historically or presently. Since the library features a wide variety of subjects in its holdings and the librarian often presents material in an interdisciplinary fashion with other content teachers, the scope of this unit covers a number of topics. It will examine the sources and extent of the three rivers as well as their history. Particular attention will be paid to the beginning of the Lewis and Clark expedition, the importance of the Ohio River as a conduit to freedom for enslaved Africans, the building of the Kinzua Dam with its attendant confiscation of First Nations' lands, the rivers as a source of disease, and some of the many floods of these rivers. Additionally, it will include the quality of the river water, the types of riverbeds they traverse, and the biodiversity of life in and along the rivers. The economic significance of Pittsburgh's rivers to the region as well as to the country, both historically and presently, will be demonstrated. The impact of local industry on the health of the rivers and on the people whose livelihoods and recreation have depended on the rivers will be included. Recreational use of the rivers in the past and in the present will be explored. The classes will read and listen to some of the songs that have been written about the three rivers. Stories spawned by the rivers, fiction, folktale, and historical, will be presented to the pupils. The targeted participants will be third, fourth, and fifth graders, but for

some of the activities, such as the songs and stories, the kindergartners through second graders will also be involved.

Rationale

Pittsburgh's fortunate position at the forks of the three rivers has determined its economic place in the world. Studying the three rivers will serve to expose Pittsburgh Public School children to information that is probably new to them and to inculcate in them a better understanding and appreciation of their own city and region. Although many pupils see the rivers weekly, if not daily, they have little knowledge of their history, extent, composition, flora and fauna, stories, culture, and significance to the region and country. There are some amazing facts associated with the rivers that have resulted in Pittsburgh's placement at the top of the charts in a number of categories throughout its history. Not all of these number one categories have been in positive areas of data, but they are of interest nonetheless.

During the geologic era known as the Pennsylvania Period, a forest comprised of trees and ferns, such as Calamites, Cordaites, Lepidodendron, and Sigillaria, unseen by humans, existed in western Pennsylvania. Coal deposits were formed. In the Tertiary Period erosion and folding occurred, forming the Appalachian Mountains. Prehistoric mammals, such as condylarths, creodonts, and glyptodonts, inhabited the region. The three rivers that meet in Pittsburgh used to flow into Lake Erie 60,000 years ago. As the aftermath of one of the glacial periods, this one occurring 50,000 years ago, the course of the three rivers changed, eventually following their present-day paths (Bissell 36-37, Parker 4, and Way 28-29). When the first people came to the area of the rivers there was a large and virgin forest called "The Great Forest" or "The Black Forest of America" that was distinguished from all other North American ones by being hardwood. This "Black Forest" was part of the "Central Forest," containing more varieties of trees than elsewhere in North America. There was no undergrowth because the treetops were so dense with vines (Bissell 33,36). When one of the first settlers came to the Allegheny upper watersheds, there were thousands of bison. By 1806, they were gone from the region. Panthers had come and gone. Bull elk inhabited the Allegheny forests until the 1860's. They weighed between 1,000 and 2,000 pounds. In 1867 one of the last elk was killed by a Native American. Lynx died out around this time. After bounties were offered for timber wolves, they, too, vanished. Now deer, red, black, and gray squirrels, skunks, chipmunks, beaver, ground hogs, muskrats, porcupines, rabbits, wild cats, foxes, otters, raccoons, weasels, sables, and mink can still be found (Way 111-119).

The first people to encounter the area were First Nations peoples. Around 10,000 B.C.E. Archaics who were hunter-gatherers living in groups numbering twenty-five to fifty lived in western Pennsylvania. They lasted until about 1,000 B.C.E. It is thought that they used circular bark covering frameworks for shelter. The Archaics were succeeded by the Transitional people living along rivers and streams. Their existence was more connected to rivers than that of the Archaics. They left behind broad spear points and cooking vessels. The Mound Builders, so named for their burial and ceremonial mounds, followed (Garbarino 4-5). The earliest known group of Mound Builders were the Adena from approximately 500 B.C.E. to 200 A.D, according to Garbarino (5), but one of his sources says that the Adena lived in the Ohio Valley from 1,000 B.C.E. to 200 B.C.E. when they were absorbed by the Hopewell (Dragoo 3). The Hopewell lived in the area from 100 B.C.E. to 350 A.D (Garbarino 5). Following the Mound Builders, the Monongahela and McFate were present in the Allegheny Valley, the Monongahela until the early 1600's A.D. and the McFate from 1450 A.D. to 1600 A.D. The Monongahela built huts inside of a circular fort. In the center of the hut was a heating or cooking hearth. Sleeping benches made from sticks and lined with skins or mats lined the walls. In addition to hunting and gathering, they grew crops, including sunflower, corn, beans, and squash. Among the plants that the Monongahela gathered was the chenopodium whose seeds were ground into flour and whose leaves were cooked. They lived in an egalitarian society. People were usually buried facing the rising sun, with adults buried inside of the village area and children under the houses (Boyd 9, 13, 17). The McFate used incised pottery and lived in palisaded villages. The Owasco were in northern Pennsylvania and New York from around 1,000 A.D. to 1300 A.D. (Garbarino 6-8). According to First Nations people, the Allegewi lived along the banks of the Allegheny River followed by the Lenni Lenape, "real or original people," and the Mengwe. The European colonists renamed the Lenni Lenape Delaware. The Mengwe formed the Five Nations or Iroquois Confederacy whose leaders were Deganawida and Hiawatha. The Iroquois called themselves Kanonsionni, "people of the longhouse" (Garbarino 8-11, Parker 8-9).

The Allegheny River took on new importance with the advent of the Europeans. There is evidence of trade with Europeans by 1550 (Garbarino 6). Prior to this, the First Nations peoples had engaged in an agrarian economy supplemented by subsistence fishing, hunting, and gathering. In order to obtain the tools and implements used by the colonists, the Iroquois began to barter beaver. When the Allegheny Valley began to be regarded as a resource for beaver to supply the European market demand, the Iroquois hunting grounds, requiring a larger territory than was previously necessary, became depleted. The Iroquois engaged in a series of wars known as the Beaver Wars with the Erie Nation and others, much of the fighting taking place along the Allegheny River. The Allegheny River and Ohio River valleys became the home of the Lenni Lenape

clans from the eastern part of Pennsylvania in the early 1700's. The French utilized the Allegheny to maintain contact between its northern and southern lands. People used the Allegheny River to get to the mountain passes and the Allegheny and Ohio to travel to the Gulf of Mexico (Garbarino 12-15).

During the French and Indian War, the Monongahela and the Allegheny were used as sites for forts and storehouses (Parker 10-11). In December, 1753, George Washington, then a major in the Virginian army, returning from a mission for Governor Dinwiddie to the French commander, and Christopher Gist, a woodsman, hunter, and explorer, were on a raft crossing the Allegheny River at Pittsburgh when Washington fell in. They spent a freezing night on Wainwright's Island, now known as Herr's Island or Washington's Landing, and the next morning walked across the frozen river to a trapper's home on the Monongahela (Parker 44, 45, 47 and Garbarino 17, 20, 21). James Smith, an eyewitness, wrote after General Braddock was defeated at the fort where the three rivers meet that he saw First Nations people burn some British soldiers alive on Smoky Island in the Allegheny just opposite the fort. That fort started out as British, Fort Prince George, then was torn down by the French and became Fort Duquesne, was burned by them as they vacated in 1758, then was rebuilt as Fort Pitt by the British (Sajna 19, 21,23 and Way 73-77).

The Allegheny River was the scene of much fighting during the Revolutionary War. Whites violated the Treaty of Fort Stanwick and encroached on First Nations' lands. Forts were erected (Armstrong and Crawford); others were evacuated (Hand, Laurens, and Randolph). First Nations' towns and crops were destroyed. First Nations people raided White settlements. Bounties for scalps were offered to First Nations people by the British; bounties for scalps were offered to Whites by the Pennsylvania government (Garbarino 43-50).

After the Revolutionary War the rivers began to be heavily used for transporting goods and people. In the trek to the West, people piled their household goods, animals, and themselves onto rafts and floated and poled their way. "The Monongahela became the superhighway to the Ohio and on west" (Parker 14). Dairy products from the Allegheny Valley were transported up to Lake Erie and New York. Salt was carried down French Creek and the Allegheny River from Syracuse to Pittsburgh. Many logs were floated down the Allegheny. The heyday for lumber traffic on the Allegheny was from the 1840's through the Civil War (Way 104). My own great-grandfather and his brothers floated logs harvested from trees along the riverbank of the upper Allegheny down the river. The first commercial riverboat building started along the Monongahela. A wide variety were manufactured, including flatboats, keelboats, pirogues, skiffs, bateaux, arks, broadhorns, barges, packet boats, Kentucky boats, New Orleans boats, steamboats, and ocean-going vessels. Later, the Allegheny and upper Ohio

were home to boat builders, but they did not exceed the boatyards and later shipyards along the Monongahela . Farmers who grew rye had an easier time transporting it overland as whiskey. As flatboats and keelboats became common means of transportation, the whiskey was shipped down South on flatboats. Herman Melville wrote of the “unspeakable old Monongahela,” referring to the well-known product of the Monongahela Valley. Farmers took their rye to both the distilleries and the gristmills. Whiskey was the most profitable use of the rye. Whiskey was even used as currency! (Bissell 52-53 and 133-144 and Parker ix-x and 80-81). The keelboat used by Lewis and Clark was built at Pittsburgh. In fact, Meriwether Lewis began the Lewis and Clark expedition at Pittsburgh on the thirty-first of August in 1803 (Interview with Lewis and Clark re-enactors, Jackson 121-123, and U.S. Army Corps of Engineers poster). Keelboat packet service was advertised in the Pittsburgh Gazette in September 1786. Even after the advent of the steamboat, keelboats continued to be used on the Monongahela as late as 1845 and on the Allegheny as recently as 1862 (Bissell 57). In Europe as well as in the United States steamboats had been invented by others before Robert Fulton. A man named Fitch operated a route along the Delaware River in 1790, and Samuel More operated a route between New York City and Hartford. Fulton and his partners had money and were able to buy topnotch materials and hire the best quality workers. In 1811, four years after Fulton’s *Clermont* was built, his *New Orleans* was launched on the Monongahela River traveling to the Ohio, and down the Mississippi to New Orleans. It was piloted by Nicholas J. Roosevelt, who was accompanied on the history-making journey by his wife. She gave birth in Louisville, and they encountered and survived the 1811 earthquake on the Mississippi River (Bissell 59-65)! The use of the steamboats allowed the coal trade to boom along the rivers. While coal had been mined in the area from at least 1760, across the Monongahela from Fort Pitt, the steamboat enabled it to be moved faster and more easily for extensive trade. Prior to the steamboat, coal had been transported in a variation of the flatboat, (Bissell 106, 114 and Parker 182).

The Allegheny River was a major contributor to the outcome of the War of 1812. Materials required to build the fleet that Commodore Perry used to defeat the British at Lake Erie as well as cannon balls were transported by keelboat from Pittsburgh up the Allegheny River and French Creek. Then they were hauled overland to Presque Isle from Water Town. Overland trails from Pittsburgh, Buffalo, and Cleveland to Presque Isle couldn’t stand the weight of the wagons and horses need to carry the material. It couldn’t be sent from Buffalo or Cleveland on Lake Erie because the British fleet controlled the lake. The Battle of Lake Erie was a determining factor in winning the war against the British (Garbarino 62-62 and Way 95).

Pittsburgh, in part due to its rivers, played a significant role in the Underground Railroad. "Pittsburgh was a natural terminal on the Underground Railroad because of its location on the Ohio, Allegheny and Monongahela Rivers and because of its wooded hills and deep ravines" (Blockson 157). "Because of its location, the intensity of feelings, and its growing black population, Pittsburgh became the most active station on the Underground Railroad in western Pennsylvania" (Blockson 154). It was the terminus for two escape routes. For those people moving northward from Pittsburgh, the Allegheny and the Ohio Rivers were used. Other places in southwestern Pennsylvania had stations on or along the rivers. Beaver County, situated on the Ohio River north of Pittsburgh, was a hub of Railroad activity (Blockson 152 and 154 and Switala 59-60). One route from Brownsville to Pittsburgh followed the Monongahela. Brownsville is situated on the Monongahela and on the National Road and thus was a very active spot on the Underground Railroad. The little town of Denbo, upstream from Brownsville, and the towns of California, Charleroi, Monessen, and Belle Vernon, downstream from Brownsville, also were stations (Switala 55, 57-59). Along the Ohio the Pennsylvania towns of Aliquippa, Sewickley, Leetsdale, Baden, and Rochester provided stations (Switala 62). Specific homes and buildings can be found using the sources mentioned here and in the bibliography. In the town of Monongahela an old barn near the river bank was used as a hiding place (Blockson 158). The Ohio River was used for escapes into Ohio, Indiana, and Illinois (Hagedorn).

A number of narratives exist depicting the three rivers as the conduit of escape for fleeing enslaved Africans. John Parker, an African American inventor and foundry owner employing both Black and White workers in Ripley, Ohio, traversed the Ohio to bring out people in Kentucky. A successful businessman, he never forgot the horror of being forcibly separated from his mother at the tender age of eight. One of his many trips back into slave territory was to try to convince a family that he could help them to freedom. Because the family had attempted escape once before, the plantation owner slept with the enslaved family's baby at the foot of his bed and a loaded revolver on the table next to the bed. Parker's second trip across the Ohio after this family was successful, but Parker's shoes were dropped and left in the escape. That night, after returning from his successful rescue, Parker was confronted by one of his employees holding his shoes. The employee was the son of the plantation owner (Rappaport). Children with whom I shared this story remembered it long afterward. Eliza, mother of six, crossed the icy Ohio River with her baby in her arms and hunters on her trail. She told her rescuers that she would return in the summer for her other five children. Since she and the baby were enroute to Canada, Reverend Rankin, her rescuer, didn't look for her to return. When she did, Rev. Rankin's son led the slave hunters on a wild goose chase while Eliza, her five children in tow, escaped to safety across the Ohio with two hundred

pounds of household goods (Hamilton 68-70)! A number of fascinating escape stories can be located in the books cited here and in the bibliography.

I had occasion to witness the result of a contemporary escape attempt utilizing the local rivers. While boating with friends along the Ohio one summer, I spotted a duffel bag floating in the water. I fished it out, took it home, and dried it on a clothesline. Inside the duffel bag was a Bible, some Boy Scout material, clothes, and a prescription inside a pair of Boy Scout shorts. I called the optometrist's office where the prescription was written and was able to obtain the owner's telephone number. A few days later the young boy (fourteen) came to the house accompanied by his older brother. He had run away from home, convinced that his Boy Scout training had armed him with enough knowledge of the outdoors to survive along the riverbanks. He had not taken into consideration the rising waters in near flood conditions that were an aftermath to recent storms. A lock operator rescued him near Elizabeth, a small town on the Monongahela River. After checking with him to ascertain that his home situation had improved, I returned his bag and wished him well.

In addition to actual people making their escapes along the rivers, and others aiding in these escapes, characters of folklore and fiction can be found along the rivers. Mike Fink is known to have existed, but folkloric stories have grown around the real person, just as they have around John Chapman, or Johnny Appleseed. Mike Fink plied his trade as a keelboat operator on the Ohio and Mississippi Rivers. Stories abound of his aim, his courage, his cleverness, and his strength (Bowman and Malcolmson 129-130). Sal Fink, Mike's daughter, sailed keelboats on the Ohio and Mississippi, among other rivers, often at her father's side. She was known as the 'Mississippi Screamer,' bellowing loudly, fighting, and riding the river on the back of an alligator (SanSouci 51-53). Joe Magarac worked in a steel mill along the Monongahela. All he wanted to do was eat like a mule and work like one. He possessed super strength and could stir hot molten steel barehanded (Malcolmson 29-33). Annie Christmas, a larger than life, robust woman worked the rivers on keelboats. She seems to have been African-American in the earliest citations, but then she became European-American in some versions of her exploits (Botkin 228-230, Hamilton 84- 89, Jagendorf 128-133, and San Souci 35-40). One tale even tells of Mike Fink's staying out of her way after she threatened him (Botkin 229). Steamboat Annie, a tall tale character who wrestled an enormous catfish in the Ohio River, I could find only in one fiction book (Wright).

Not everything the rivers did for the Pittsburgh region was good. Pittsburgh's rivers placed it in the number one position for typhoid fever. The heavy industry in Pittsburgh and in towns along the rivers combined with the lack of a sanitation

system and a water filtration system caused the Pittsburgh area to climb to the top of the charts in typhoid incidence during the late nineteenth century (Drake).

A mystery associated with the Monongahela River occurred in the 1950's and an investigation took place in the 1990's. A TB-25N medium bomber ditched in the river near Homestead at 4:10 p.m. January 31, 1956. The six occupants lived through the crash, but two died from the water's low temperature. A search for the bomber was reportedly conducted during the next two weeks without success. Some people thought that the Army had surreptitiously removed the B-25 the night after the crash. Using side-scan sonar, the B-25 Recovery Group began a scientific investigation in 1995. They have mapped the river bottom, interviewed experts on silt deposition and bomber construction, and collected data from both civil and government sources. They have concluded that the bomber is buried in a gravel pit on the river bottom at Bird's Landing. At the moment the recovery group lacks the funds to proceed further (B-25 Overview).

The Pittsburgh region has been the scene of many floods during the period of recorded history. First Nations people warned the early settlers not to build homes close to the Allegheny River. They themselves had moved away from the Allegheny to nearby streams. They had known the river to flood to the treetops. The settlers didn't heed the warning, reasoning that high waters would enable them to use the river for transportation (Sajna 213-214). Notable floods occurred in 1762, 1763, fifty major floods during the nineteenth century, 1907, the St. Patrick's Day flood in 1936, which was the greatest flood in Pittsburgh's history, 1954 as a result of Hurricane Hazel, 1963, 1967, 1972 as a result of Hurricane Agnes, 1985 as a result of Hurricane Juan, and 1996 (Parker 104-113).

People at one time thought that the floods from the three rivers, which had caused much damage and claimed many lives through the years, were caused by deforestation. Debate about possible solutions waged until the St. Patrick's Day flood of 1936. The federal government then passed the Flood Control Act of 1936. Three dams were built in the Allegheny basin. The Army Corps of Engineers considered the possibility of constructing a dam on the upper Allegheny in 1928. Congressional approval was granted for the Kinzua Dam nine miles upstream from Warren in 1936 followed by modifications to the plan in 1938 and 1941. Residents, rivermen, and the Seneca Nation all voiced opposition to the proposed dam. In 1791 Pennsylvania had drawn up a treaty granting Chief Cornplanter and his descendents 860 acres north of Warren along the Allegheny in gratitude for his peacekeeping efforts with the settlers. The federal government had granted the Senecas more than 30,000 acres in Cattaraugus County, New York, also along the Allegheny, in 1794. Congressional testimony stated that since the 860 acres were a state grant, they could be reclaimed under eminent domain, but that the 30,000 acres would necessitate a Congressional act to obtain

them. World War II pushed back decision on the proposal. The existing dams modified the effects of Hurricane Hazel in 1954 but were insufficient to prevent flooding of downtown Pittsburgh. River communities including Pittsburgh lobbied for the dam. The Senecas obtained an injunction, but a federal district court said that Congress could seize the Seneca lands regardless of violating a federal treaty. The U. S. Supreme Court upheld the federal district court in 1959. Much sympathy for the plight of the Senecas was voiced, and the Seneca Nation employed engineers to offer an alternate solution. A consulting firm approved by the Senecas and the Army Corps of Engineers rejected the alternative plan as being too costly and resulting in more people being displaced. Three members of the firm had been Corps employees. President Kennedy sent a letter to the Seneca Nation explaining the reasons for deciding on the Kinzua site and assuring the people that he had directed federal departments and agencies to assist them in their relocation. Yet another federal treaty with First Nations people was broken. According to one of the residents, the Corps first approached elderly women living alone in the small towns being displaced by construction to buy them out. The last families in the town of Corydon battled in courts. There were threats of violence. The last families were paid much more for their homes than the first ones. To save Chief Cornplanter's grave, the Senecas finally obtained a hillside for his reburial, but the descendants wanted a site with space for gatherings. The Corps refused to build an access road to the proposed site (Sajna 216-231).

World history was recently made on the Monongahela and Ohio Rivers when a dam was constructed on land and floated up the rivers. In the fall of 1999 construction began in a huge pit, 600 feet by 400 feet, at Leetsdale, Pennsylvania, on the banks of the Ohio River. It was a replacement for the nearly century old Braddock Dam that was beyond repair. The new dam was built by the Army Corps of Engineers in two segments. The first segment, weighing 11,000 tons and 333 feet long, 104 feet wide, and 60 feet high, was floated out to the Ohio River, guided by towboats July 26, 2001. As it passed beneath the downtown Pittsburgh bridges, I was there to witness history, disposable camera in hand. When it passed Sandcastle, a waterpark built on land formerly occupied by steel mills, it had a clearance of only six inches from the river bottom. Prison inmates (from barred windows) joined in witnessing history in the making. The construction process was used for the first time in the world. It's called in-the-wet or float-in construction. The second part of the dam was put into place in June, 2002 (Silver D-1, Roddy and Silver A-4, Pro B-4, *Post-Gazette* East Neighborhoods).

The contrast in the two rivers that form the Ohio River is striking. There are differences in length, in temperature, in flora and fauna, in history, and in use. The Allegheny River is 325 miles long. It is listed in the *World Almanac and Book of Facts* as one of the major rivers in North America. The Monongahela is

128 miles long. It is not included in this reference book as a major river. “The Monongahela is the hardest-working river in America. It carries more tonnage per mile than any other river in the United States—and probably the world” (Parker 2). The Allegheny originates as a spring in a farmer’s field marked by a historical marker near Colesburg, Pennsylvania, flows west to Coudersport, Pennsylvania, and then travels north into Cattaraugus County, New York before traveling south to Pittsburgh (U. S. Army Corps of Engineers 1). Its riverbanks are heavily wooded and the river has often been described as “pristine.” The idea that so much of the Allegheny River yet retains its pristine character amazes those who know it: “. . . that a river in a region as battered and bruised by industry as western Pennsylvania remains primitive still seems incredible” (Sajna 2-3). The Monongahela originates near Fairmont, West Virginia, where the West Fork River and the Tygart River converge, and is known as a working river, although parts of its banks are wooded and its path scenic. Islands in the Allegheny contain rose quartz and other rock as a result of the aforementioned glaciers. Pebbles in the gravel bars are smooth and polished due to the glacial activity (Way 29-30). The Monongahela was described in 1750 as being “royley,” meaning muddy (Bissell 37). In 1949 the upper part of the Monongahela River was described as “pretty clear most of the time. . .” (Bissell 38). However at the same time the lower end was said to be “. . . probably as powerful a brew as the one the witches cooked up in *MacBeth*. . .” (Bissell 38). The Allegheny River is generally colder than the Monongahela. The former flows through mountainous area while the latter’s temperature is influenced by the industry along it resulting in thermal pollution. There are still coal-fired power plants along the Monongahela, which are one of the largest sources of warming. For the same reason, the Allegheny generally has better water quality than does the Monongahela (interviews with David Schwab and Mark Philips). The Allegheny River is mined for sand and gravel, while the Monongahela is not. It is more economically advantageous to mine the Allegheny. It contains less silt than does the Monongahela (interview with Nancy Taylor). Much industrial pollution has been cleaned up along Pittsburgh’s rivers, allowing the comeback of wildlife not seen in many years.

The Ohio River formed by the Allegheny and Monongahela at Pittsburgh flows west forming the southern border of Ohio, Indiana, and Illinois. At Cairo, Illinois, it flows into the Mississippi. It is 981 miles long with forty-six low level locks and dams. The drainage area is approximately 205,000 square miles. Its river basin lies in the North American basin. The Ohio carries more than 100 million tons of freight a year. It “. . . is used the most of all the rivers in the world except for the Panama Canal” (*Monkeyshines on America* 12). The Port of Pittsburgh, which includes the Ohio, the Allegheny, and the Monongahela, is the largest inland port in terms of tonnage in the country (Parker 192).

Along even a heavily trafficked part of the Allegheny River one can see great horned owls, pileated woodpeckers, warblers, scarlet tanagers, orioles, grosbeaks, towhees, wood ducks, goldeneyes, hooded mergansers, common mergansers, red-breasted mergansers, scaup, ring-necked ducks, grebes, blue herons, green herons, loons, ospreys, bald eagles, tundra swans (sporadically), black snakes, milk snakes, garter snakes, ringneck snakes, spiny soft-shelled turtles, clams, deer, beaver, raccoons, woodchucks, red foxes squirrels, and skunks. Presently there are ring-billed gulls nesting on the Highland Park Bridge which spans the Allegheny in Pittsburgh near the Highland Park dam (interview with Patrick McShea). Since the cleanup of much of Pittsburgh's industrial pollution, there has been a return of fish the Allegheny. Some are large mouth bass, muskies, smallmouth, northern pike, walleye, sauger, sucker, paddlefish, and gizzard shad and shiner minnows which serve as food for the larger fish (Sajna 73). Recently large numbers of mayflies have appeared in Pittsburgh. For about 150 years they had disappeared because of the pollution in the Allegheny River. Their reappearance is a welcome sign of the Allegheny's health. These insects don't bite, live twenty-four to forty-eight hours, and when they die, they are eaten by fish and birds. It is the only known insect to molt after becoming winged (Srikameswaran A-7).

Along the banks of the upper Monongahela one can find beech, white oak, buckeye, maple, black walnut, cottonwood, hawthorn, poplar, sweet gum, hemlock, red cedar, linden, crabapple, trailing arbutus, orange azalea, wild azalea, white anemone, trillium, violets, and ragwort (Bissell 97, 100). Since the industrial cleanup, the entire Monongahela contains bass, crappies, bluegills, walleyes, sauger, and muskies. (Parker 2). At the Braddock, Gray's Landing, and Maxwell Dams there have also been found saugeye, hybrid stripers, white bass, rock bass, spotted bass, channel catfish, flathead catfish, longnose gar, gizzard shad, mooneye, spotfin shiner, emerald shiner, carp, longnose perch, pumpkinseed, green sunfish, freshwater drum, northern hogsucker, black redhorse, river redhorse, silver redhorse, golden redhorse, shorthead redhorse, river carpsucker, small mouth buffalo, and quillback (Weisberg). It also contains the hellbender, an amphibian resembling a mudpuppy (interview with Kathy Derge).

Although much progress has been made in bringing back an environment compatible with the health of the rivers, the air, and all living creatures in the area, one aspect of Pittsburgh's recent industrial era looms threateningly: acid mine drainage. When the chemicals used in coal mining combine with water, acid mine drainage results. If the chemical-filled water remains in the mines, it doesn't greatly impact the environment. However, when it seeps out of the mines into the surrounding habitats, it causes great destruction. It corrodes machinery in and along the rivers. It requires more expensive water treatment. It gets into the

ground water and the rivers, affecting the whole food chain. It is estimated that the Monongahela River in particular will be affected by blowouts from the mines (interview with Mark Philips).

The so-called fourth river at Pittsburgh's Point, about which I had heard and read as a child, turns out to be in reality not a river, but an aquifer. There are numerous layers of water-bearing sand and gravel through which a large amount of water flows. This does not meet the definition of river. It is named the Wisconsin Aquifer, from which the fountain at the Point derives its water (interview with Richard Dowling).

A number of songs have been written about the three rivers. Robert Schmertz composed several of them: "Monongahela Sal," "Lock Number Ten," "The Forks of the O-hi-o," "Mon Petit Lapin," and "The Queen Anne Front and the Mary Ann Behind." He also wrote "The Rambling River Line," but it has no particular river mentioned in it (Schmertz). A popular song by the Drifters was remade by a local singing group, The Jaggerz, that included the names of the three Pittsburgh rivers. The song is "Gonna Move across the River." During the Pittsburgh Bicentennial school children sang, "Pittsburgh Is a River Town." Dear Friends, a local group who sang nineteenth century songs, made a cassette tape called *Roll on, Monongahela: River Songs from Pennsylvania and Beyond*. Among others the tape contains "In the Valley Where the Allegheny Flows," "Peter Gray," "Ripples on the Allegheny," "Lock Number Ten," and "Raft Song." Patti Page sang "Allegheny Moon" in the 1950's. At a celebration of riverboat whistles, Edgeworth School children sang "Down the River, Down the Ohio." Others I have located are "Beautiful Ohio," "Down by the O-hi-O," and "Round on the End and High in the Middle, O-hi-O." T. Carl Whitmer composed "The Three Rivers," performed by the Mendelssohn Choir with Russell Wichmann, conducting (Whitmer). The song "Pittsburgh's Dirty Water" debuted on radio station WWSW-FM. Eric Bohlen and Jim Merkel adapted a tune from 1966 by the Standells called "Dirty Water" (Pittsburgh Post-Gazette, January 6, 1988, page 5).

People fished and canoed on Pittsburgh's rivers for centuries. During the industrialization period, the Pittsburgh area was not suited for either. Now, however, fishing and boating have made a huge comeback. Folks also use the rivers for jet skiing, water skiing, listening to the Pittsburgh Symphony, cruises on the Gateway Clipper fleet comprised of five excursion boats, rides on the Rubber Ducky boats, the Three Rivers Regatta, the home of the first Formula One boat races, dining at restaurants overlooking the water, and water taxis.

Presenting this unit in an interdisciplinary fashion demonstrates to our student population that learning can flow from one subject area to another. They

can discover this through history, geography, cultural geography, biology, environmentalism, research skills, literature, art, and music.

This interdisciplinary unit meets some of the standards currently utilized by the Pittsburgh Board of Education: Arts and Humanities Standards, #1, #2, and #3; Career Education and Work Standard #2; Citizenship Standards #1, #2, #4, and #9; Environment and Ecology Standards #2, #4, and #5; Information Literacy Standards #1, #2, #3, #5, and #9; Mathematics Standard #2 ; Reading, Writing, Speaking and Listening Standards #1, #2, #3, and #7; and Science and Technology Standards #2, #4, and #7. (See Appendix for these standards written out.) Third graders study Pennsylvania and Pittsburgh history. The fifth grade social studies curriculum addresses United States history, including slavery and abolition. Fourth grade science classes complete a FOSS water module that includes properties of water, the quality of local water sources, and how water moves through various materials. The fifth grade science classes take an excursion on the Voyager, a traveling science classroom/laboratory where the children examine the quality of water through chemical testing, take surface water samples of algae and plankton, take bottom samples of macro-invertebrates, and search for the waterfowl and migratory birds along the rivers. The research skills involving maps and reference materials are proscribed for these grades. In the Pittsburgh Public Schools, these grades have had the necessary skill base for this instruction. This unit could also be used by sixth and seventh grades with modification. Some of the stories and songs can be shared with kindergarten through second grade.

Objectives

The overall goal of the unit is for the classes to develop a knowledge of, and an appreciation of, the rivers that have been and continue to be so much a part of the city in which they reside.

Citizenship Standard #2 will be fulfilled by the pupils' being able to identify the states through which the three rivers flow. Their locating the rivers on a map using lines of longitude and latitude also is in keeping with Citizenship Standard #2. The students' calculating the distance between the origin of the Monongahela and the origin of the Allegheny based on the latitudes of each will enable us to satisfy Mathematics Standard #2.

Information Literacy Standard #1 and Reading, Writing, Speaking, and Listening Standard #1 will be fulfilled by the classes' identifying key words to find information related to the three rivers. Their use of Encarta to locate material on the topic is in keeping with Information Literacy Standards #1, #2, #3, and #9

and Reading, Writing, Speaking, and Listening Standard #1. The pupils' using cross references in the encyclopedias, both book and electronic, to find information on the rivers and the early inhabitants of the area will enable us to satisfy Information Literacy Standards #1, #2, #3, and #9. Their employing Power Library to locate material on the rivers will fulfill the requirements for Information Literacy Standards #1, #2, #3, and #9.

The students' learning the importance of the Ohio River and that of the local boat builders to the Lewis and Clark Expedition is in keeping with Citizenship Standards #1 and #2. Their identifying the role of the Ohio River in enabling fugitive enslaved Africans to escape to freedom will enable us to satisfy Citizenship Standards #1, #4, and #9. Citizenship Standard #9 will be fulfilled by pupils' reading about the confiscation of First Nations' lands protected by federal treaty in order to construct the Kinzua Dam. Their studying about the various First Nations who inhabited the riverbanks and used the rivers is in keeping with Citizenship Standard #1.

Citizenship Standard #1 will be fulfilled by their learning about the major floods of the rivers with the attendant efforts of the governments to alleviate the problem as well as the sheer number of floods throughout the known history of the rivers.

Students' researching the impact of local industry on the rivers and the way of life of the nearby residents is in keeping with Science and Technology Standards #4 and #7, Career Education and Work Standard #2, and Environment and Ecology Standard #2. Their examining the types of riverbeds through which the rivers flow and the biodiversity of life within and alongside of the rivers will enable us to satisfy Science and Technology Standards #2 and #4.

Reading, Writing, Speaking, and Listening Standard #7 and Arts and Humanities Standard #1 will be fulfilled by the classes' listening to folktales and anecdotes of historical occurrences along the rivers and discussing them. Having the children compare the folktales with others they have read or heard will enable us to satisfy requirements for Reading, Writing, Speaking, and Listening Standards #3 and #7 and Arts and Humanities Standards #2 and #3.

Strategies

To engage the interest of the classes and to accommodate a variety of learning styles, material will be presented by a few different methods. I shall use films so that the children can see the rivers in motion, especially the parts beyond the city limits with which they may not be familiar. Large maps from the United States

Department of the Interior will enable the pupils to see where the rivers originate and the paths they follow to their culmination points. Aerial photographs of the rivers will help them to get the “big picture” and to see how technology is useful in viewing their own environment. The art teacher will show the classes paintings of the rivers and pictures of various bridges that cross them. She will have the students build models of bridges so that they will gain hands-on knowledge and insight. The art classes will sketch river scenes and paint a mural. I’ll supply background material to them so that they can have a historical perspective. I’ll show the timeline from *The Mystery of the Monongahela Indians*. The art teacher and I will help the classes create a large timeline with symbols in the hall outside of the library. Software showing the beauty of the rivers and their riverbanks and recreational pastimes enjoyed on the rivers will inspire them to see and experience the rivers for themselves. Interactive websites will give the pupils a greater sense of immediacy when studying the rivers’ and the river vessels’ past. Historic photographs will augment the written material in a more vivid way than mere words can impart. Big charts and maps of the Lewis and Clark Expedition will help make that part of history come alive. The science teacher will have the children in cooperative learning groups present their findings on the fauna in Powerpoint. Partners and cooperative learning groups will conduct research in the library and in the computer lab using print and electronic reference tools. I’ll coordinate the timing of the lessons with the social studies teacher and will provide background material on the rivers to be used in her classes. Storytelling and singing often appeal to children, both the academically inclined and those not so. I’ll use the folklore of the rivers as well as the stories of escapes from bondage using the rivers as a conduit. Asking pupils to compare various stories will engage them in the higher levels of learning according to Bloom’s Taxonomy. I’ll show examples of river poetry and will encourage the classes to compose their own. The music teacher will teach the river songs that I have found. Fossils from the riverbeds obtainable from the Carnegie Museum of Natural History and the Pennsylvania Fish and Boat Commission will allow the classes to see and feel the remnants of past flora and fauna.

Classroom Activities

The fourth and fifth grades at my one school currently come to the library for one forty-minute period on alternate weeks. At my other school the fourth and fifth graders have library for one forty-five minute period each week. The other grades have library once a week.

To introduce the unit, I shall show the video, *The Mon, the Al, and the O*, so that the classes can have a view of all three rivers in motion and be introduced to

a snippet of their history, importance, and recreational use. I'll ask if the children have had any experiences on the rivers that they would like to share.

To offer visual aids in describing the location of the rivers, I shall use the maps, showing the beginnings of all three and their extent. Using the latitudinal markings, the pupils will calculate the distance from the Allegheny's origin to the Monongahela's origin.

I'll give a brief history of the area covered by the rivers dating back to prehistory and the various First Nations peoples who inhabited the area. I'll present the book, *Who Came Down That Road?*, to provide a sense of the same place being inhabited by a succession of flora and fauna through the passage of time. I'll share the *Mystery of the Monongahela Indians* with the classes so that they can get a better understanding of their way of life and feel a connection to people who lived here so long ago.

The classes will form into cooperative learning groups to look up information on the three rivers, including their names. I shall encourage them to use more than one source for the meanings of the word Monongahela and to find more than one definition. They will use books, Encarta, and the Pennsylvania Online World of Electronic Resources. Part of the library science curriculum teaches how to use key words to look up information.

The upper classes will read President Kennedy's letter to President Williams of the Seneca Nation found in Searchasaurus, a child-friendly search engine in Pennsylvania Online World of Electronic Resources.

The science teacher and I will give the classes the names of some of the fauna found in the rivers and along the riverbanks. Using key words and note taking skills (also a part of the curriculum), the pupils in cooperative learning groups will write reports and present them using Powerpoint.

In the library science curriculum the third grades are taught the parts of a title page. The fourth and fifth grades are taught parts of a book, e.g., half title page, dedication page, foreword, preface, introduction, appendix, text, index, and table of contents. I shall use some of the books listed in the bibliography to accomplish these aims and to familiarize the classes with the books.

I have already begun to share some of the escape stories with the fourth and fifth grades, and they have been requesting the books to borrow. I'll tell them various stories of the folktale and fiction characters mentioned in the Rationale. They will compare these protagonists and stories with others that they know.

I'll show on the Smart Board the poems, "River Games" and "Barges" from *Splash! Poems of Our Watery World* to inspire the classes to compose their own poems about the rivers.

As a culminating activity, the classes will view the CD-ROM, *Looking for Something Fun to Do in Pittsburgh?* on the Smart Board. The music teacher will have the classes sing some of the river songs. The art teacher will have an unveiling of the children's mural. We shall show historic photographs of the major floods in the Pittsburgh region and of the many boats at the Point. The science teacher, the social studies teacher, and I will cook First Nations and early Pennsylvania cuisine. This will be followed by a ride on the Rubber Ducky boats along the three rivers.

"I've known rivers: I've known rivers ancient as the world and older than the flow of human blood in human veins. My soul has grown deep like the rivers."

Langston Hughes

Annotated Adult Reference Bibliography

Books

Ashworth, Ralph. *Greetings from Pittsburgh, a Picture Postcard History* Lanham. Vestal Press, 2000. Introduction tells how author came to collect the Pittsburgh postcards and a history of postcards and postcard collecting. Illustrated with more than 200 black and white photographs of Pittsburgh postcards accompanied by informative annotations.

Bissell, Richard. *The Monongahela* New York. Rinehart & Co., Inc., 1949, 1952. Part of the Rivers of America series. Author had been deckhand, second mate, and pilot on the Mon. Twenty chapters relating his experiences, history of the river, the industries along it, and a description of the wildlife along the riverbanks. A couple of racist terms quoted from others.

Blockson, Charles L. *African Americans in Pennsylvania, Above Ground and Underground, an Illustrated Guide* Harrisburg. R. B. Books, 2001. Introduction gives Blockson's background and interest in pursuing his subject. Eight chapters dividing the state geographically and one on the Underground Railroad. The locations of state historical markers relating to African American heritage scattered throughout text. Selected bibliography. A fold-out map showing African American communities. Detailed index. Appendices include an Underground Railroad glossary, African American population by county based on the 2000 census, and cities and towns that had Underground Railroad stations arranged by county.

Blockson, Charles L. *The Underground Railroad, Dramatic Firsthand Accounts of Daring Escapes to Freedom* New York. Berkley Books, 1987. Preface sharing author's personal ancestral history of enslavement and his path to writing the book, introduction, bibliographical essay, thorough index. Book divides narratives into states, territories, regions, and Canada.

Blockson, Charles L. *The Underground Railroad in Pennsylvania* Jacksonville. Flame International, Inc., 1981. Foreword tells of the omissions of others' works on the subject and of how Pennsylvania was the key to the Underground Railroad. Nine chapters divided geographically tell of people and places connected to the escape system. Footnotes, extensive appendix including a glossary, bibliography, index. Some typographical errors. A map, black and white photographs and prints.

Botkin, B. A., editor. *A Treasury of American Folklore: the Stories, Legends, Tall Tales, Traditions, Ballads and Songs of the American People* New York.

Crown Publishers, Inc., 1944. Foreword by Carl Sandburg. Hundreds of entries. Indices of authors, titles, subjects, names, and first lines of songs. Editor was president of American Folklore Society and folklore expert at the Library of Congress.

Botkin, B. A., editor. *A Treasury of Southern Folklore: Stories, Ballads, Traditions, and Folkways of the People of the South* New York. Crown Publishers, 1949. Foreword by Douglas Southall Freeman. Hundreds of entries including how nicknames originated. Indices of authors, titles, subjects, names, places, and first lines of songs. Editor was president of American Folklore Society and folklore expert at the Library of Congress.

Dragoo, Don W. *Mounds for the Dead: an Analysis of the Adena Culture* Pittsburgh. Carnegie Museum, 1963. Written by the curator of the Section of Man, this book delves into the types of artifacts, tools, and culture of the Adena, their predecessors, and their neighbors.

Garbarino, William. *Along the Allegheny, a History of the Early Events along the Allegheny and Its Tributaries* Midway. Midway Publishing, 2000. Introduction, description, a history of the peoples who have inhabited the banks, various struggles for the river, early navigation, and a summary. References are notes referred to in text. Index. Good map of river and its tributaries. Replete with misspellings, incorrect punctuation, and incorrect grammar.

Hagedorn, Ann. *Beyond the River, the Untold Story of the Heroes of the Underground Railroad* New York. Simon & Schuster, 2002. Preface relates an 1838 incident. Thirty-two chapters chock full of escape stories and betrayal stories. Author writes that she used many primary sources and searched for at least two accounts for each anecdote used in the book. Notes. Selected bibliography. Detailed index. Two maps.

Jackson, Donald, editor. *Letters of the Lewis and Clark Expedition with Related Documents, 1783-1884* Urbana. University of Illinois Press, 1962. Useful annotations inserted amongst the letters.

Korson, George, editor. *Pennsylvania Songs and Legends* Philadelphia. University of Pennsylvania Press, 1949. Songs divided by type. Index and list of songs and ballads. Tells where songs were sung and by whom.

Parker, Arthur. *The Monongahela: River of Dreams, River of Sweat* University Park. Pennsylvania State University Press, 1999. A Keystone Book. Preface relates the uniqueness of the river, its contribution to history, and the

perspective of the author from riding towboats the length of the river. Twenty-two chapters. A history of the river and the industries that grew along and on it with an account of its progress during post-industrialization and future plans. Colored photographs, black and white photographs, and maps. Bibliography and index.

Schafer, Jim and Mike Sajna. *The Allegheny River, Watershed of the Nation* University Park. The Pennsylvania State University Press, 1992. A Keystone Book. Preface relates how the Allegheny has touched much history and influences the whole country as well as how author came to write the book. Fifteen chapters. A history of the river and an account of its comeback in the post-industrialization era. Colored photographs by Jim Schafer. Black and white historical photographs also. Thorough bibliography. Endpapers are maps.

Schmertz, Robert. *A Picture Book of Songs and Ballads* Pittsburgh. The Robert Schmertz Book Fund, 1976. Arranged by Lee B. Thomssen. Edited by Jo Davidson. Contains a biographical sketch of Schmertz, notes on Thomssen, and Davidson. Twenty-one songs, six of which deal with Pittsburgh's rivers.

Siebert, Wilbur Henry. *The Mysteries of Ohio's Underground Railroads* Columbus. Long's College Book Company, 1951. Foreword tells how author came to write book and about his travels in pursuit of first hand stories. Four sections dividing the state's routes geographically and giving background of fugitive slave laws. Detailed index.

Sprague, Stuart Seely, editor. *His Promised Land, the Autobiography of John P. Parker, Former Slave and Conductor on the Underground Railroad* New York. W. W. Norton, and Company, 1996. Preface is a biographical sketch of Parker and how the autobiography came to be published after trials and tribulations.

Switala, William J. *Underground Railroad in Pennsylvania* Mechanicsburg. Stackpole Books, 2001. Preface explains author's research and includes four previously published books that describe Pennsylvania's Underground Railroad. Fourteen chapters cover 1775-1865. Included are setting, historical background, regional escape routes with names and places, and the role of organized religion. Notes are citations from text. Thorough bibliography.

Thwaites, Reuben Gold. *Afloat on the Ohio, an Historical Pilgrimage of a Thousand Miles in a Skiff, from Redstone to Cairo* Carbondale. Southern Illinois University Press, 1897, 1999. Twenty-one chapters relating author's voyage with his wife, child, and a doctor and historical information about the environs. Some racist terminology in describing First Nations peoples.

Way, Frederick, Jr. *The Allegheny* New York. Rinehart Company Inc., 1942. Part of The Rivers of America series. Twenty eight chapters including account of his ride from Olean to Pittsburgh in a motorboat. Some racist comments about First Nations people.

Whitmer, T. Carl. *The Three Rivers* Pittsburgh. Volkwein Brothers, 1959. Choral for SATB. Sheet music with words. Thirty-six pages.

Newspapers

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Pittsburgh Post-Gazette, July 27, 2001, page A-4. “‘What the Heck is That?’” by Dennis B. Roddy and Jonathan D. Silver.

Pittsburgh Post-Gazette, December 5, 2001, page B-4. “Half of New Dam to Ride the Mon to Braddock Site” by Johnna A. Pro.

Pittsburgh Post-Gazette, June 20, 2002. “East Neighborhoods.”

Pittsburgh Post-Gazette, June 25, 2002, Page A-7. “Capital Clearly a Good Sign, Mayflies Are Back” by Anita Srikameswaran.

Pittsburgh Post-Gazette, July 6, 2003, Sports page 1. “Experts to Check out Shanopin Mine” by Deborah Weisberg.

Pamphlet

Drake, Chester. “Pittsburgh’s Conquest of Typhoid Fever” in *Pittsburgh’s Health*, June, 1932.

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AAA. *Illinois, State Series.*

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United States Geological Survey. *Allegheny River, Pittsburgh West, Allegheny, PA.*

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United States Geological Survey. *Ohio River Pool, 302 Paducah West, McCracken, KY.*

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Websites

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Interviews

Derge, Kathy, herpetologist, Pennsylvania Fish and Boat Commission, conducted by telephone 8 July 2003.

Dowling, Richard, director, Public Affairs Office, U. S. Army Corps of Engineers, Pittsburgh District, conducted by telephone 7 July 2003.
Lewis and Clark re-enactors, conducted in person Labor Day 2000.

McShea, Patrick, program specialist-teacher resources, Education Department of Carnegie Museum of Natural History, Pittsburgh, PA conducted by telephone 2 July 2003.

Philips, Mark, hydrolic engineer, U. S. Army Corps of Engineers, Pittsburgh District conducted by telephone 7 July 2003.

Schwab, David, webmaster, Information Management Office, U. S. Army Corps of Engineers, Pittsburgh District conducted by telephone 3 July 2003.

Taylor, Nancy, environmental geologist, U. S. Army Corps of Engineers, Pittsburgh District, conducted by telephone 7 July 2003.

Youngblood, Nat, artist and former art director for *Pittsburgh Press*, West Middletown, PA, conducted in person 26 April 2003.

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Hamilton, Virginia. *Her Stories, African American Folktales, Fairy Tales, and True Tales* New York. The Blue Sky Press, 1995. A collection of sixteen tellable folktales and three autobiographical recollections of elderly women. Helpful notes follow each tale. Useful sources section. Illustrated by Leo and Diane Dillon.

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Hartford, John. *Steamboat in a Cornfield* New York. Crown, 1986. A nonfiction account told in verse of how a steamboat departed Pittsburgh and wound up in an Ohio cornfield, the subject of headlines and tourism. Notes on the fate of the people and boat included. Photographs.

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Jagendorf, Moritz Adolph. *Folk Stories of the South* New York. The Vanguard Press, Inc., 1972. A collection of ninety-five folktales divided into sections according to states. Foreword by George F. Reinecke. Illustrated by Michael Parks.

Levy, Constance. *Splash! Poems of Our Watery World* New York. Orchard Books, 2002. A collection of thirty-four poems celebrating water in its various forms and describing its sundry functions. Includes one on rivers and one on barges. Watercolor illustrations in shades of blue by David Soman.

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Scarry, Huck. *Life on a Barge, a Sketchbook* Englewood Cliffs. Prentice-Hall, Inc., 1982. An account of the author's barge trip through the Netherlands featuring his pencil sketches. Includes the various work done on barges and the children's lives on board the family barges. Shows scenes of the Erie Canal, France, and Britain.

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U. S. Army Corps of Engineers. *Follow the Trail* Map of Lewis and Clark Expedition. Identifies important localities.

Maps

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U. S. Army Engineer District, Pittsburgh District. *Plan of Development, Authorized Civil Works Projects* 1997.

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CD-ROMs

Sustainable Pittsburgh. *Looking for Something Fun to do in Pittsburgh?* CD-Rom. Pittsburgh. Sustainable Pittsburgh, n.d. An action-packed compact disc showing recreation along Pittsburgh's rivers and providing recreational opportunities statistics for the region.

Web Sites

ENature.com www.enature.com Has online field guides, wildlife indigenous to zipcode regions, native plant guides, habitat guides, and a park finder.

Watershed Atlas.com www.watershedatlas.com Provides a changing landscape of the rivers, an illustrated explanation of a watershed, and maps of the Allegheny and Monongahela Rivers.

Appendix

Standards

Arts and Humanities

1. All students describe the meanings they find in various works from the visual and performing arts and literature on the basis of aesthetic understanding of the art form.
2. All students evaluate and respond critically to works from the visual and performing arts and literature of various individuals and cultures, showing that they understand important features of the works.
3. All students relate various works from the visual and performing arts and literature to the historical and cultural context within which they were created.

Career Education and Work

2. All students assess how changes in society, technology, government and the economy affect individuals and their careers and require them to continue learning.

Citizenship

1. All students demonstrate an understanding of major events, cultures, groups and individuals in the historical development of Pennsylvania, the United States and other nations, and describe the patterns of historical development.
2. All students demonstrate understanding of themes and patterns of geography, know the location of major bodies of water, land masses and nations, and describe the relationships between geography and historical, economic and cultural development.
3. All students examine and evaluate problems facing citizens in their communities, state, nation and world by incorporating concepts and methods of inquiry of the various social sciences.
9. All students demonstrate an understanding of the history and nature of prejudice and relate their knowledge to current issues facing communities, the United States and other nations.

Environment and Ecology

2. All students analyze the effects of social systems, behaviors and technologies on ecological systems and environmental quality.
4. All students evaluate the implications of finite natural resources and the need for conservation, sustainable agricultural development and stewardship of the environment.
5. All students demonstrate an understanding of the local, national and international implications of environmental and ecological issues.

Information Literacy

1. The student who is information literate accesses information efficiently

and effectively.

2. The student who is information literate evaluates information critically and competently.
3. The student who is information literate uses information accurately and creatively.
5. The student who is an independent learner is information literate and appreciates literature and other creative expressions of information.
9. The student who contributes positively to the learning community and to society is information literate and participates effectively in groups to pursue and generate information.

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Mathematics

2. All students compute, measure, and estimate to solve theoretical and practical problems, using appropriate tools, including modern technology, such as calculators and computers.

Reading, Writing, Speaking and Listening

1. All students use effective research and information management skills, including locating primary and secondary sources of information with traditional and emerging library technologies.
2. All students read and use a variety of methods to make sense of various kinds of complex texts.
3. All students respond orally and in writing to information and ideas gained by reading narrative and informational texts and use the information and ideas to make decisions and solve problems.

7. All students listen to and understand complex oral messages and identify their purpose, structure, and use.

Science and Technology

2. All students demonstrate knowledge of basic concepts and principles of physical, chemical, biological and earth sciences.
3. All students explain the relationships among science, technology, and society.
7. All students evaluate advantages, disadvantages, and ethical implications associated with the impact of science and technology on current and future life.