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In addition to these duties, Scott coordinates the University's Consortium for Energy, Economics and the Environment (CE³) which supports applied, interdisciplinary research across the university. In these roles, Scott works with a variety of different local environmental organizations throughout Southeast Ohio; serves on several local and statewide committees dealing with surface water management, energy research and policy development; and acts as a liaison between state and federal agencies and local stakeholders interested in using the university's resources to improve the natural environment of the region.

King Coal By Scott Miller

For almost 200 years coal has played a unique role in shaping the economic, cultural and social fabric of southeastern Ohio. Rich deposits of coal were laid down in this region during the Mississippian and Pennsylvanian geologic periods 360 to 290 million years ago when this area sat upon the edge of a vast inland sea. Ages of plant material were laid down upon each other, compressed by the material above, and dried into the thick coal seams that now exist in this region. It is these coal seams that have fueled the economy of the state and nation throughout the industrial revolution, through two world wars and into the modern day.

The existence of coal in Ohio was first noted near what is now known as Sandy Creek in Tuscarawas County in 1748 (ODNR, 2005). While it's impossible to know exactly when coal mining began in Ohio, the first recorded production was 100 tons taken from a mine in Jefferson County in 1800. Belmont County in eastern Ohio is by far the historic statewide leader in coal production followed in order by Harrison, Jefferson, Perry, Athens, Tuscarawas, Guernsey, Muskingum, Meigs and Noble Counties (Crowell, 1995).

Athens County lies at the heart of what is known as the Hocking Valley Coal fields. The primary coal in this region is known as the Middle Kittaning #6, an unusually large seam of coal that was prized for its high energy content. The Hocking Valley Coal Field comprises portions of Athens, Hocking and Perry Counties. At the turn of the 20th century these fields were some of the most productive in Ohio, contributing as much as 40% of all of the state's coal (Orton, 1884).

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Early mining operations were generally small scale subsistence mining - family owned mines that yielded only enough coal to heat the home or operate a family-owned business such as a blacksmith shop. It is many of these small underground mines that remain unmapped and undescribed in current mine catalogs and that play an important role in current remediation efforts. Unmapped mines are hazardous and represent a significant health and safety concern for local landowners and citizens. A mine subsidence in March 1995 caused a portion of the eastbound lane of Interstate Route 70 (I-70) in Guernsey County to collapse. This subsidence and the ensuing repair work closed both lanes of I-70 for several months, and cost of repair work was estimated at 3.8 million dollars (ODNR, 2003). Smaller subsidences cause hundreds of thousands of dollars of damage to homes and businesses every year in Ohio.

While small mine operations undoubtedly existed throughout the region in the early 19th century, large-scale coal mining didn't come until there were effective means of transporting it to end users. The Hocking Canal, which ran from Columbus to Athens, was completed in 1843 and opened up the region for transportation and commerce. Nelsonville especially profited from the canal (Bogsavitz and Levine, 1996). The canal was used to get not only coal, but other commodities such as timber, salted meats, tobacco and wool to market (Tribe, 1977). The Hocking Canal expanded the coal trade in the region between 1843 and 1869 however it was not until the railroads emerged that coal extraction significantly increased. The railroad superseded the canal as the most important mode of industrial transport in the 1840s and 1850s. The railroad was quicker, cheaper to build, and reached much larger metropolitan areas. The Columbus and Hocking Valley Railroad was the first rail line to reach Athens in 1870. This railroad paralleled the Hocking Canal, and quickly drove the canal out of business. The railroads also consumed coal supply their boilers which also increased coal consumption. These steam-powered trains remained the most prominent mode of transportation in the region until the 1940s when diesel and electric trains became widespread (Miller et al, 1997).

Once coal was discovered and mining became profitable, Europeans arrived in large numbers to meet the needs of the mine operators. Poles, Slovaks, Welsh, Scottish, Italians, Hungarians, Germans, Irish and many other ethnic groups eventually settled in this region. Mining communities sprung up and became ethnic enclaves unto themselves. Many languages were spoken in the region and traditions from "the old country" were passed down from generation to generation. To this day it is not uncommon to hear eastern European languages and traditions being honored in the small communities of the coal fields.

Virtually everything in these small towns revolved around coal mining. Doctors and tradesmen were paid by the Mine Company and food and household goods were purchased from the company store. The family home was often provided by the mining company and was paid off, slowly, by miners who sacrificed deep underground for as little as three dollars per day for their labor. Miners were usually paid in company scrip, a type of promissory note that was only redeemable by the company after a period of time (sometimes years later) (Crowwel, 1995). The scrip was usually only recognized as legal tender within the confines of that company's town. Though the practice legally ended

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with the passage of the Jones Act in 1885, it actually continued well into the 1900's with one local miner commenting that he didn't even know the United States government printed its own currency until he joined the army in WW II (Nunley, 1997).

With coal mining the only job to be had, frequently well-educated men who in their home towns in "the old country" held jobs as doctors and lawyers were relegated to taking jobs as laborers and miners. This was backbreaking work before the time of large scale mechanization. Most mines were what are referred to as drift mines whereby an opening is begun in a hillside and the mine shaft "drifts" to wherever the coal seam takes it. Most mine shafts were only as high as the coal seam was thick and wages were often determined by the thickness of the coal seam. Often, miners working in thin seams were paid more on a per-ton basis than those who were who worked in thick seams. The apparent reason has to do with the generally higher quality of the coal in smaller seams versus the amount of poor quality coal and waste shale in larger seams (Crowell, 1995). Oftentimes miners had difficulty just reaching the working face, or work zone, of the mine. Many mine works extended hundreds or thousands of yards from the entrance.

Once the miners arrived at the work face, conditions were not for the faint of heart. Underground mine works are frequently poorly lit, cramped, damp, cold and dirty. The coal dust was everywhere and breathing was often difficult. After many years of breathing in coal dust, large numbers of miners eventually succumbed to black lung disease often with fatal consequences (Crowell, 1995). This was a hard-scrabble life but families made due as best they could because coal was king.

The lack of adequate pay, unsafe working conditions, the company stores, and short life spans often led miners to organize work stoppages. One of the most infamous of these strikes occurred in June of 1884 when miners struck against the Hocking Valley Coal and Iron Company; better know as the "Syndicate" to protest falling wages. When the Syndicate brought in 250 Italian replacement workers and, shortly thereafter 1,250 additional replacement miners, violence erupted. The Governor of Ohio was forced to call out the militia to maintain order and the mine owners were required to hire Pinkerton detectives to guard their operations.

On October 11, 1884 the out-of-work miners' anger boiled over. They placed timber in coal cars, soaked them with oil and kerosene, ignited them, and pushed them into five separate mines near New Straitsville. Most of the fires were extinguished very quickly, but several were not brought under control and continue to burn to this day. The burning coal soon became a conflagration. The Coal Trade Bulletin (1918, v. 39, no 12, p. 60) reported that "*The blaze is an inferno and the draft forces the flames nearly 100 feet and it can been seen for miles along the hills, resembling a volcano.*" With the burning coal came remarkable reports of homes being vacated by residents with crumbling foundations, people who were able to make coffee and tea with the water they pumped directly from their wells, and one farmer who dug roasted potatoes directly out of his garden (Time Magazine, 1936).

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With these reports, the mine fires soon began to draw national attention as people began to travel to New Straitsville to see for their own eyes these remarkable events. Two tour concessions soon opened up and began to compete for business and the Ripley's "Believe It or Not" radio show broadcast from the mine fires. Over the last 123 years it is estimated the fires destroyed many square miles and millions of tons of coal (Crowell, 1995) and New Straitsville and the surrounding area continues to suffer from subsidences near underground voids created when the coal was consumed.

Work stoppages, low coal prices, frequent drops in wages and economic despair led coal miners to begin to organize into labor unions in the mid and late 1800's. The United Mine Workers can trace their roots to this region. Competition was fierce for the hearts and minds of the workers in some of the first unions in the area and many early labor organizations had to hold clandestine meetings to avoid being brutalized by competing bands of miners. Eventually however the two strongest mine labor organizations, the Knights of Labor and the National Progressive Union of Miners and Mine Laborers joined forces on January 25, 1890 during a meeting in Columbus to form the United Mine Workers.

Coal has left a number of legacies for the people of southeast Ohio. Economic prosperity followed by severe downturns, mine fires, labor unrest and, ultimately, labor organizing, and a unique environmental legacy, acidic mine drainage.

One of the traits of the Middle Kittaning #6 coal is its high sulfur content which is both a blessing and a curse. The elevated amounts of sulfur increased the thermal output of the coal when burned, but it contributes to the formation of sulfuric acid. Through a relatively simple chemical reaction, high sulfur coal when mixed with oxygen from the air and with water in rain, snow or underground drainage, can create sulfuric acid which is harmful to plant and animal life and has been linked to the loss of aquatic life in streams and rivers throughout southeast Ohio and Appalachia.

Acid mine drainage has destroyed or degraded hundreds of miles streams in southeastern Ohio (Miller et al, 1997). Over the last ten years a number of local communities and non-profit organizations have arisen to meet the challenge. With funding from state and federal agencies and technical training and assistance from colleges and universities such as Ohio University, they are beginning to restore their environment, and to stem this most devastating environmental legacy.

These projects are not easy. Many local groups work at a watershed scale which frequently cover hundreds of square miles. The work frequently involves years of water monitoring, data analysis, engineering design work, fundraising, grant management and construction and inspection. It is not uncommon for a single project to take as much as five years of field and design work and cost upwards of half a million dollars - and there are frequently many such projects in a single watershed. Even so, these groups are beginning to show successes. In the Raccoon Creek watershed, located just west of Athens, the local watershed group recently documented 23 miles of stream restoration by documenting the return of fish and aquatic insects to the stream following one recent

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project. The Monday Creek watershed group is currently in the process of partnering with the US Army Corps of Engineers and is hoping for a federal appropriation of almost \$20 million to assist that group in its preservation efforts. And the Huff Run partners in Tuscarawas County recently received a highly-competitive \$1 million US EPA partnership award to continue its restoration activities.

These efforts have been joined, in turn, by the people of the Hocking Valley Coal Field who have formed small community-based organizations to preserve and promote the rich culture and history of the area. The Little Cities of Black Diamonds Council, a group that strives to tell the story of the small towns of the coal field is one such example. Rural Action, another local non-profit has been at the forefront of work to promote cultural preservation and watershed restoration and their partners are working hard to continue to restore this important resource. Recently, these efforts were enhanced by the reauthorization of the federal Abandoned Mine Land Fund which is the largest source of funding for this work. Under the new legislation Ohio is set to triple the amount of funding it will spend on mine land restoration over the next ten years.

With worldwide energy demand forecast to increase by as much as seventy percent over the next twenty-five years, the future is very bright for the coal industry in Ohio. Recent pronouncements in both Washington DC and Columbus are pointing to the increased use of coal. It is important to understand that coal is, and will remain, the most abundant domestic resource to power our economy for many years to come. The question facing our region and our nation is how we intend to make sure we're not destined to repeat the mistakes of the past.

Citations:

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