A History of Conservation and Preservation in the Commonwealth of Virginia From World War II to the early Twenty-First Century

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Introduction

The citizens of the Commonwealth of Virginia have enjoyed an intimate and symbiotic relationship with their natural environment and resources from the colonial period to the present. The natural beauty and wealth of nature's abundant resources have defined the economic direction of the Commonwealth, as well as affected its legislative policies and preservation initiatives. The symbiosis between economic success and human health, and the sustainability of natural habitats, has been in the forefront of environmental preservation from the post- World War II (WWII) period to present. Initially anthropogenically motivated, environmental preservation during the postwar and Civil Rights era centered around a desire to preserve green space for human recreational enjoyment. The rhetoric of the Civil Rights Movement, which forced ordinary citizens to reevaluate the dignity awarded to individuals and natural resources, cast a new light on the importance of a clean and healthy environment. No longer seen as a landscape free for the unregulated use of industry and development, the natural world began to take on a persona of its own, with intrinsic value awarded to the green spaces of the Commonwealth. State Senator Fitzgerald Bemiss was instrumental in pioneering a state-organized conservation initiative with his landmark study *Virginia's Common Wealth,* and the resulting legislation and development of the Virginia Outdoors Commission, and the Virginia Historic Landmarks Commission.

This conservation foundation, borne from a desire to increase the size and abundance of state parks and recreation areas, gave way to a more scientific approach in the 1970s and 1980s as the negative externalities of human development began to surface in health issues and economic

loss. This era of command and control environmentalism resulted in a system of legislative acts and regulations which created finite limits on the amounts and frequency of pollutants introduced by specific industries, as well as creating a framework of state agencies to monitor and enforce these regulations. Modern environmentalism has moved beyond the command and control approach to involve an element of sustainability and smart growth which is reflected in more ethically-based business initiatives. The market for clean energy and the costs of polluting the environment have begun to deter development in the traditional manner, and have fostered a growing culture saturated with innovation and sustainable growth ideas. Despite the progress made within the Commonwealth, major environmental problems still threaten the stability of the region's natural resources, biodiversity, human health, and economic investments. Regulations struggle to keep up with the new obstacles presented by growth and development, which indicates that a paradigm shift is necessary to fundamentally change how humans relate to the environment and its natural resources. The environmental movement is dependent on widespread cooperation between the citizens and the industries which reside within the Commonwealth. Ecological understating coupled with sound business and economic planning can result in a Virginia which is beautiful, prosperous, and representative of the rich historical and natural legacy of the state.

A Brief History of Mid-Twentieth Century Virginia

Despite the importance of the conservation movement, one must recognize the historical significance of events occurring within the pre- and post-WWII period which motivated a statewide trend for environmental preservation in the 1960s and following decades. Going back to the Great Depression era and decades before WWII, Virginia occupied a stratum of southern states that resisted change from government intervention, resented the welfare system, and

protested the assimilation of African Americans into the white-dominated social and political life. Virginia was traditionally a conservative state with a devotion to the status quo, and during the Great Depression, rejected the New Deal and its welfare programs designed to uplift destitute citizens. Arguably, this resistance stems from the protests of Senator Harry Byrd (1933-1965) and this rejection of government aid programs were attributed to a "Shortsighted devotion to fiscal conservatism and faith in the power of self-help."[1] This culture valued the traditional way of life, and resisted change in social and economic terms because it threatened the feudalistic economic polarization of those who controlled land and thus wealth, and those who worked the fields and produced the tobacco and other crops responsible for Virginia's pre-depression economic success.

The turning point in the economic stagnation of the Depression and social awareness came during WWII. The conflict abroad effectively brought the state onto a more equitable platform, forcing citizens into positions and industries previously inaccessible, and compelling the isolationist American perspective to begin to consider issues beyond its borders. Virginia played a major role in the war effort, from direct contribution in soldiers and labor, to industries essential for producing ships and supplies for soldiers in combat. "On July 1, 1943, Virginians in the armed forces numbered 146,371 of whom 117,676 were white and 28,695 were colored."[2] This major contribution to the war effort depleted domestic industries of workers, and fundamentally restructured the work culture during the war period. Furthermore, the demand for arms and ships bolstered the Hampton Roads shipbuilding industry, creating a demand for labor which brought former agricultural workers into an industrial and urban setting for the first time.

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[1] Ronald L. Heinemann et al., *Old Dominion, New Commonwealth, a History of Virginia 1607-2007* (Charlottesville: University of Virginia Press, 2007), 318.

[2] Virginia Conservation Commission, *Virginia in Wartime 1942-1943* (Richmond: Division of Purchase and Printing, 1944), 12-13.

Women were also called into the work force to maintain the positions vacated by men contributing directly to the war effort. Additionally, the lack of available workers in the agricultural fields, as farmers and their sons traveled to cities for the war effort, motivated a technological shift in farming practices. The remaining workers began to revitalize and update the field, relying on the mechanization of tasks to accommodate a dwindling labor force.[3] As a result, the productive capacity of the state improved, and increased efficiency required less human capital to produce the same quantity of goods.

These events were important in Virginia's conservation history for a number of reasons. First, the war upset the status quo which valued the traditional roles of citizens; with power consolidated in the wealthy landowners' control, there was little political clout for women and African Americans to challenge this power. As men moved to cities to join the war effort or enlisted in the military, women were left to maintain industries formerly closed to them. The ability to work and generate an income provided a level of liberation to this group, allowing many women to earn an independent living for the first time in their lives. Moreover, the mechanization of farming and demand for urban workers led to an influx of citizens into cities, and to the evolution of Virginia from an agricultural to an industrialized and urbanized state. The ability to join the military and work in war industries also helped to liberate many African Americans who formerly operated in a system which prevented any social mobility or income source beyond farming and agricultural labor and a limited range of service jobs. "More than the Depression and the New Deal, World War II transformed the country into a modern welfare state with new international responsibilities. No region experienced greater change than the south, with its one-party politics, sleepy rural existence, one-crop agriculture, and racial segregation

[3] Virginia Conservation Commission, *Virginia in Wartime 1942-1943* (Richmond: Division of Purchase and Printing, 1944), 12-15.

pushed to the point of extinction."[4] Virginia was transformed from an antiquated farming state in the 1930s to a rapidly urbanizing state with a growing industrial economy after the war. The change in traditional roles of women and blacks facilitated discussion on human rights and equality, and expedited a growing social push for change in the decades that followed.[5] In addition, pressures from more progressive parts of the state (Northern Virginia and larger growing cities such as the Hampton Roads area) eventually influenced public opinion. This would in turn affect the course of environmental legislation as different groups and social awareness began to gain a foothold in the state political scene.[6]

From a demographic standpoint, a trend toward urbanization and an increase in economic activity fueled by the war effort led to rapid population growth from 1940 through the 1960s. In 1940, the Commonwealth had 2.63 million citizens. By 1962, this number had grown to 4.2 million.[7] These statistics are important because they demonstrate the power of economic growth in sustaining an urbanizing population. As insecurity of income became less of a threat to more citizens, a dialogue about social issues (influenced by the atrocities of the war and a growing awareness for human rights) began to affect social politics in the state. Issues challenged after the war included improvement in prison conditions, an expansion of welfare programs and state pension plans, an increase in salaries for teachers, the unionization of coal and other mining industries, and equity at the polls.[8] The statistics on political enfranchisement of blacks is especially important: "In 1940 only 22 percent of the population voted in the general election…

[4] Heinemann et al., *Old Dominion, New Commonwealth,* 323.
[5] Ibid., 325.
[6] Ibid.
[7] Virginia Department of Conservation and Economic Development, *A Hornbook of Virginia History* (Richmond: The Virginia State Library, 1965), 99.
[8] Heinemann et al., *Old Dominion, New Commonwealth,* 332-334.

[Virginia ranked] 43rd in the nation"[9] with African Americans occupying the most poorly represented group.

Awareness of social issues such as these paralleled the emergence of the environmental movement because it demonstrated a concern for equity and the awarding of dignity to groups and individuals previously denied the consideration. The environment, like African Americans and women, occupied an essential role in Virginia's economic stability, and yet was denied due respect because concern for its health and longevity did not exist in traditional cultural paradigms. Resource abundance and excess were taken for granted, and as industrialization and a growing population began to put a greater demand on these resources, awareness for environmental health became a more widely discussed and politically debated topic.

The Commons Ideology

Before delving into Virginia's conservation history, it is necessary to define a key concept which is paramount to the understanding of this field and its academic concerns: the 'commons' ideology. Preservationist Garret Hardin occupies a sector of environmentalists who view the individualist nature of humanity, and the ever-increasing human population and consumption issue, as fundamental to environmental decline. Hardin's essay, "The Tragedy of the Commons," is somewhat of a political satire, as well as a sociological challenge which requires the reader to confront the difficult question, the question that most do not wish to ask: how does a modern society combat environmental issues associated with over-population without relinquishing any of the modern conveniences and standards of living enjoyed by the

[9] Ibid., 332.

developed world, and desired by the developing world?[10] What Hardin asserts is that the earth's carrying capacity is currently being challenged, and technological innovation is not sufficient to combat the issue of resource depletion and environmental decline. Carrying capacity refers to the limit to which the earth's resources are able to support plant and animal life, and that this amount is not infinite but limited by available resources. Essentially, "A finite world can only support a finite population; therefore, population growth must eventually equal zero,"[11] or humanity will exceed the earth's sustainably limits which will initiate a sequence of irreversible environmental decline.

He then goes on to give the example of a pasture and herdsmen as a platform for a commons and the resultant human nature which leads to unregulated resource exploitation. The following excerpt outlines his argument:

> Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.[12]

Once natural forces promote human population growth beyond a sustainable limit, the natural tendency of man to increase his yield motivates him to exploit the common resource to his individual benefit. If this same individual were to allow a field to lie fallow and let the pasture recover, because of the nature of the commons and, as Hardin argues, of human nature, then another person will utilize that same resource for his own personal gain. This same issue comes

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[10] Garrett Hardin. "Tragedy of the Commons," *Science New Series 162,* no. 3859 (December, 13, 1968), http://www.jstor.org/stable/1724745: 1243.
[11] Ibid., 1243.
[12] Ibid., 1224.

about with common grounds for dumping waste and for pollution disposal. If the land is left communal and without regulation, then individual propensity for personal gain will lead to resource exploitation and open pollution, for if the first man does not do so it is only natural for another to seize the opportunity.[13] Although published in 1968, Hardin's thesis remains a relevant argument in modern environmental discourses, and this theme recurs throughout the Commonwealth's environmental decline from the colonial period onward.

This idea of the commons is essential in understanding the history of Virginia's environmental movement. The abundance of game, fish, and other natural resources observed when Virginia was first colonized by Europeans in the early 17th century created a culture of plenty within the hearts and minds of those who developed the Commonwealth.[14] Virginia possesses a plethora of resources from natural minerals, coastal fishing and associated resources, plentiful woodlands and timber, rivers and streams for transportation and potable water, along with fertile soil and a favorable climate for cultivation. A culture of exploitation became commonplace from these colonial roots, where individuals felt no incentive to conserve because the abundance of resources made the idea superfluous in comparison to the economic potential of the land. By the late eighteenth century, the Commonwealth touted a competitive agricultural economy built on the institution of race-based slavery. Tobacco was the major cash crop and Virginia was later dubbed "The Cigarette Capitol of the World."[15]

The first evidence of environmental degradation arose in the Commonwealth by the early nineteenth century. As stated previously, Virginia's economy in the colonial era and afterwards was based on agriculture and mineral extraction. Tobacco, wheat, grain, coal, and iron were

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[13] Ibid., 1223-1226.
[14] Margaret T. Peters, *Conserving the Commonwealth: the Early Years of the Environmental Movement in Virginia* (Charlottesville: University of Virginia Press, 2008), 1.
[15] Heinemann et al., *Old Dominion, New Commonwealth*, 263.

among the most profitable commodities. Additionally, the abundance of navigable waterways leading to the Chesapeake Bay and the Atlantic Ocean made Virginia and its river cities centralized locations for the trade and shipment of these products. Coal mining in western counties funded the expansion of railroads to access and transport these resources to port cities and beyond.[16] Despite the profitability of these industries, "Coal mining and widespread timbering caused real damage to Virginia's hillsides and streams. But just as in the seventeenth century, Virginian's viewed natural resources as unlimited and expressed little concern for conserving the landscape."[17] Here the idea of the commons comes into play as unabated resource consumption and waste deposition begins to affect the natural habitats and quality of life for the citizens of the Commonwealth.

Heavy industry soon became a major source of water and air pollution. The "Tredegar Iron Works was one of the only two foundries in the south, and Portsmouth was home to the largest shipyard."[18] Industries such as these discharged waste directly into surrounding waterways, which was then transported downstream and into the Chesapeake Bay. Other sources of water pollution came from the direct deposition of human and animal waste into rivers and streams. In 1894, the U.S. Public Health Service recorded that the Potomac River had issues with water quality from livestock waste deposition which led to a cholera epidemic and subsequent restrictions on use of the river for potable water and bathing.[19]

The problem of direct waste deposition into rivers and streams spanned the nation, and Virginia was one of many with water quality issues directly associated with urbanization and population growth. In 1945, the State Water Control Board was established. Its mission was

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[16] Peters, *Conserving the Commonwealth,* 1-5.
[17] Ibid., 5.
[18] Department of Environmental Quality, *An Environmental History: Stories of Stewardship in Virginia* (Richmond: Department of Environmental Quality, 2008) 5.
[19] Ibid., 5.

simply, "To protect existing water quality, to reduce and prevent water pollution, and to restore and maintain state waters to a quality that would protect human health and aquatic life."[20] The significance of this agency's enabling legislation lies in its acknowledgement that human activity dramatically reduced the quality of a public resource, and that a healthy environment is the right of the people to be protected by the Commonwealth. Regulation of industry is necessary in order to maintain water quality, and these efforts need to be widespread and standardized in order to be effective. Other legislation occurring around this time included the Federal Water Pollution Control Act of 1948 and the Federal Air Pollution Control Act of 1955. For the first time the federal government addressed pollution issues for commons such as air and water.

Virginia's Conservation History from WWII to 1990

The exploitation of natural resources continued relatively unabated through the early twentieth century, and into the post-WWII period. As the focus of the nation shifted from conflict abroad and back toward issues within one's own community, social and environmental concerns assumed larger roles in politics. The economic boom following the war led to an increase in suburban communities and a dramatic rise in the number of households with two cars. As urban living space expanded, citizens began to crave unaltered natural spaces to escape the pollution and congestion of urban areas. This demand for recreational green space, coupled with growing concern for clean air, land, and water, were instrumental in the development of the Virginia Outdoor Recreational Study Commission (VORSC) on March 31, 1964.[21] There was a

[20] Ibid.,6.
[21] Peters, *Conserving the Commonwealth*, 9-12.

consensus within political circles that "Virginians cannot take open spaces for granted,"[22] and state legislative initiatives should reflect the concerns of the citizens.

Senator Fitzgerald Bemiss (1955-1966) was the head of the VORSC, which produced *Virginia's Common Wealth: A study of Virginia's outdoor recreation resources and the Virginia outdoors plan for conserving and developing them for lasting public benefit.* He, along with Attorney General Clemon Freeman Jr., worked with a research commission to create the Virginia Outdoors Plan. This document "articulated an environmental philosophy and held that it was incumbent upon a responsible citizenry to protect the cleanliness of its air and water, preserve its historic buildings and sites, and take care of its open spaces, woodlands, rivers, parks, and recreational areas."[23] Commissioned by the Commonwealth's General Assembly in 1964, the study focused on the aesthetic values of the natural world, and argued for the individual right to access green spaces for leisure and recreational activities. The report's language is very positive and inclusive, encouraging localities and individuals to participate in a statewide collective effort to improve parks and recreational facilities, and bring more parks into urban settings to benefit the needs of a growing population.[24] The VORSC and its suggested plan were well received within the General Assembly. The plan outlined a legislative package that included eight bills: the Open Space Land Act, the Commission of Outdoor Recreation, the Zoning Enabling Law Amendments, the Scenic Highway and Historic Road System, the Access Roads to Recreation Areas, the Historic Landmarks Commission, the Virginia Outdoors Foundation, and the Virginia

[22] Ibid., 12-13.
[23] Ibid., 14-15.
[24] Virginia Outdoor Recreation Study Commission, *Virginia's Common Wealth: A Study of Virginia's Outdoor Recreation Resources and the Virginia Outdoors Plan for Conserving and Developing them for Lasting Public Benefit* (Richmond: 1965), 1-10.

Park Revenue Bond Act Amendment. All eight bills passed in January 1966 and in effect the Virginia Outdoors Plan became a law within the Commonwealth.[25]

With the implementation of the Virginia Outdoors Plan, the Commonwealth's priorities began to incorporate an environmental ethic and "began what was called the golden age of environmental leadership in Virginia."[26] The plan represented an approach to conservation which did not, however, aim to understand the biology of the targeted areas, but sought to increase green space and recreational facilities for aesthetic beauty and anthropogenic enjoyment. As a result, a main focus of this legislative package motivated increase in the size and abundance of Virginia state parks. For example, Elbert Cox, who was appointed the director of the new Virginia Commission on Outdoor Recreation, received approval in 1967 to spend $3.5 million on land improvements and expansions to state parks.[27] More details on state parks and their significance will be explained later in this study.

From a national perspective, the Virginia Outdoors Plan and resulting legislation paralleled a growing concern for the environment on a national level. On April 22, 1970, the first Earth Day celebrated the natural world and sought to generate awareness for individual responsibility to preserve natural resources and open spaces. On December 2, 1970, the United States Environmental Protection Agency was formed. In 1970, the Federal Water Pollution Control Act (later to be amended and renamed the Clean Water Act in 1977) was signed into law. On October 21, 1976, "The resource conservation and recovery act, the first comprehensive amendment of the federal Solid Waste Management Act of 1965 takes effect and is administered by the EPA."[28]

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[25] Ibid., 18-21.
[26] Peters, *Conserving the Commonwealth*, 23
[27] Ibid., 23.
[28] Department of Environmental Quality, *An Environmental History*, 4-18.

Solid waste management was a pervasive issue during this time period. Landfill leachate, or waste-laden runoff from improperly sealed landfills, was a major contributor to groundwater pollution, and open dumping created superfund sites and other concentrated sources of toxic chemicals and other materials hazardous to humans and animals alike. This act standardized landfill construction and created protective barriers to ensure that these materials do not enter the surrounding environment. Additionally, the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) took effect on December 11, 1980. This piece of legislation created a system for identifying superfund sites, prosecuting the offenders, and initiating an EPA-supervised cleanup effort to return these sites to habitable conditions.[29] The significance of these laws is twofold: they reflect a growing environmental conscious on a national scale, and federal and state-sponsored clean-up and prevention initiatives demonstrate that it is the responsibility of the government to sponsor, monitor, and help preserve the collective commons resources such as air, water, and land, which can fall to the wayside under a pure market economy.

This era of environmentalism demonstrated a paradigm shift from that of the environment as a commons to one which recognizes the environment needs to be monitored and regulated because these resources are in fact finite. Additionally, the economic boom following WWII created growth and development which negatively affected air, land, and water quality. A market system does not protect resources whose intrinsic value cannot always be quantified in economic terms, and it thus became the responsibility of elected officials to protect these habitats through legislation and regulation. During this era, Virginia's increasing environmental awareness can be seen through "The adoption of article 11 of the newly revised Virginia constitution [which] took effect July 1, 1971, stating that the policy of the Commonwealth is 'to conserve, develop, and

[29] Ibid., 4-18.

utilize its natural resources, its public lands, and its historical sites and buildings [and] to protect its atmosphere, lands, and waters from pollution, impairment, or destruction for the benefit, enjoyment, and general welfare of the people of the Commonwealth.'"[30] Along with the aforementioned federal legislation, Virginia established a Council on the Environment, a state agency responsible for monitoring and implementing state environmental policies, in 1970. In 1973, the Commonwealth sponsored the Ground Water Act to protect water sources below the earth's surface and not covered by the Clean Water Act.

Concomitant with these positive advances in the fight for environmental preservation, the Commonwealth experienced its first major environmental disaster of the modern era from 1966 to 1975.[31] Allied Chemical received its patent for the insecticide Kepone in 1952, with its intended use as a cockroach and ant killer. The production of Kepone began in 1966 at a plant in Hopewell near the James River. From 1966 to 1975, this plant and a subcontractor called Life Science Products (LSP), also located in Hopewell, produced over 450,000 kg of the chemical, with approximately 90,720 kg released into the environment, with nearly 30,000 kg settling in waterway sediment. Methods of deposition included atmospheric emissions, wastewater, and direct disposal in the river.[32] Public awareness of the problem occurred only after workers at LSP began to show serious health problems. The health risks to humans included reproductive and neurological problems, as well as skin, liver, and vision impairment. The Kepone also became imbedded in the tissue of fish that ingested the substance, and it settled into sediment

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[30] Ibid., 9.
[31] Ibid., 9-11.
[32] Drew R. Luellen, George G. Vadas, and Michael E. Unger, "Kepone in James River Fish" *Science of the Total Environment* 358 (2006): 286, http://www.sciencedirect.com.proxy.library.vcu.edu/science/article/pii/s004896970500570X#.

along the bottom of the James River, making the toxins pervasive and extremely hazardous.[33] As a result of this environmental disaster, the state closed the James River and its tributaries to recreational fishing from 1975 to 1980. Commercial fishing was not reopened until 1981 when levels of Kepone in the river fell below an acceptable limit. The reopened fisheries excluded some species including bass, and other species were restricted to different times of the year when Kepone levels temporarily leveled off. These semi-restricted species included bluefish and weakfish.[34] Other species were monitored closely, and state-sponsored announcements warned citizens that ingestion of seafood from the James River carried a potential health risk.

The ramifications of this spill were twofold: the economic loss of commercial fishing access to a major river for six years, and the human health and animal risks associated with those who consumed contaminated fish during and after the spill, or for those who were exposed to Kepone in its production phases.[35] The continuous dumping of Kepone and its chemical components into the James River during its production brought to light the tragedy of the commons and how failure to monitor a public resource can lead to widespread loss. In this case, the James River functioned as a waste disposal commons. Dumping of chemicals and industrial wastes had been commonplace in many rivers for decades, but the effects of large-scale heavy industrialization began to magnify these consequences. The Kepone disaster in Virginia created a national scandal because the culprit was not only companies involved in production, but the state, local, and federal authorities who turned a blind eye to the pollution. Because chemical production was a major industry in Hopewell, regulatory agencies had made exceptions to keep production costs low for the company, ensuring its presence in Hopewell and securing the jobs of

[33] Encyclopedia Virginia, "Kepone (Chlordecone)," accessed December 5, 2013, http://encylopediavirginia.org/kepone#start_entry.
[34] Luellen, Vadas, and Unger, "Kepone in the James River Fish," 287.
[35] Ibid., 286-287.

its employees. Despite these arguably good intentions, the failure to maintain a common resource and uphold regulations resulted in widespread economic loss for the workers, the industry, and those who relied on the James River for fishing and recreational income.[36] The fishing industries even after their reopening in 1981 were slow to rebound because "Americans, wary of the Kepone scandal, refused to buy seafood from Virginia. Hundreds of fisherman went out of business. Allied Chemical and LSP, meanwhile, were sued by former workers, residents, and fishermen and found liable for more than $200 million in damages."[37] This pollution event damaged the health and wellbeing of workers and the natural environment, destroyed the livelihoods of workers, fishermen and others living along the James River, created a national scandal and attention for the Commonwealth pertaining to poor environmental management, and degraded faith in the state's seafood industry due to the pervasiveness of this chemical toxin. Although the waterways and fisheries have recovered, and contaminated sediment has been largely covered by clean sediment, Kepone in small amounts still persists in the river. Nearly 40 years after the disaster, the Commonwealth is reminded daily of the consequences of regulatory failure.

The 1980s marked a change in conservation initiatives which can be termed the "command and control" approach to pollution prevention. In environmental terms, "command and control regulations focus on preventing environmental problems by specifying how a company will manage a pollution-generating process. This approach generally relies on detailed regulations followed up by an ongoing inspection program."[38] This movement reflected a change in the nature of environmental disasters both within the Virginia and nationwide. Incidents such

[36] Encyclopedia Virginia, "Kepone (Chlordecone)," accessed December 5, 2013, http://encylopediavirginia.org/kepone#start_entry.
[37] Ibid.
[38] Encyclopedia of Earth, "Command and Control Regulation," accessed December 6, 2013. http://www.eoearth.org/view/article/151316.

as the infamous Love Canal disaster in New York and the Dioxin contamination event in Times Beach, Missouri, created a sense of fear over the negative impacts of improper toxic waste disposal, and how these wastes can enter the natural environment and affect the health of those living in the surrounding areas. The effects of environmental degradation began to draw national attention as these large focusing events brought light to the risks associated with toxic waste disposal. The command and control approach tightened regulations on existing industries and created new standards for the benign disposal of wastes in designated landfills and other areas designed to handle toxic substances. One of the biggest legislative achievements of this command and control period came on December 11, 1980, when President Jimmy Carter signed the aforementioned Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) into law.[39] "This legislation marked the beginning of the national effort to clean up abandoned sites contaminated with hazardous substances."[40]

In Virginia, the Kepone disaster functioned as a major focusing event to the issue of toxic waste disposal. In conjunction with CERCLA, the Commonwealth created programs to monitor similar issues to prevent human health and economic losses like those associated with the Kepone contamination of such a large portion of the James River and surrounding areas. On April 1, 1993, the Commonwealth of Virginia established a state Department of Environmental Quality (DEQ). This agency combined the efforts of the Council on the Environment, the Department of Air Pollution Control, the Department of Waste Management, and the State Water Control Board to "protect and [enhance] Virginia's environment, and promote the health and well-being of the citizens of the Commonwealth."[41] Created under the Governorship of Douglas Wilder per the request of Elizabeth H. Haskell, the Secretary of Natural Resources, the DEQ was

[39] Department of Environmental Quality, *An Environmental History*, 12-13.
[40] Ibid.
[41] Ibid., 14.

designed to monitor and enforce the Commonwealth's environmental mandates. The DEQ is able to issue permits, monitor land, soil, and air quality, and establish a system of accountability so that those who pollute are responsible for cleanup and prevention methods.[42] This change in approach marked a profound ideological shift over the state of the environment and the need for development methods which involve environmental regulation. Because the value of natural resources and human health are not always easily quantifiable in economic terms, market forces do not always protect biodiversity and natural habitats. As a result, the Commonwealth of Virginia initiated methods of control through state mandate. Environmental protection is intrinsic with human health and sustainable economic growth, and efforts to maintain its integrity represent a sound investment in the future of the Commonwealth.

Historic Preservation and its Role in the Conservation Movement

As stated previously, the Virginia Outdoors Plan laid the foundation for legislative initiatives to preserve the Commonwealth's natural and historic landmarks. Under this plan, the Virginia Historic Landmarks Commission (VHLC) was created by legislation in 1966; it later became the Department of Historic Resources (DHR). As part of this piece of legislation, VHLC was one of two state agencies (along with the Virginia Outdoors Foundation [VOF]) designated to accept property donations on behalf of the Commonwealth in the form of permanent easements. In 1969, the first historic preservation easement was accepted by the state from Anne Maury White, who donated an easement on Bowling Green mansion in Caroline County.

The historic preservation easement program was borne of the actions of attorney George C. Freeman, who encouraged lawmakers to create a program to protect the state's historical landmarks. The program has two components that remain to the present day. First, it is of benefit

[42] Ibid., 14-15.

to the Commonwealth to keep historic properties in the hands of their original owners and on the state's tax rolls.[43] Second, it was recognized "the best stewards of historic properties, particularly residential ones, were their owners – notwithstanding that the state could never afford to purchase and maintain all of the landmarks worth preserving."[44] The goal was to create a system of lasting legal protection of these historical properties without incurring a substantial amount of cost to the state, while maintaining the property rights and ownership status of the landowners. Tax incentives were used to draw attention to the program and create an interest in preservation. A historic preservation easement is thus the donation of property rights to the state, which pass on to future owners of the protected property as part of the deed. The easement requires a property owner to consult with the DHR before making changes to a protected property, in order to prevent inappropriate alterations, demolition of significant resources, or unsympathetic development.[45]

Financial incentives for preservation easements come in the form of lower property tax rates. The deed restrictions associated with preservation easements often reduce the market value of a property. As a result, the difference between the assessed value of a property before entering the program, and its value after entering the program can be applied as a charitable donation on federal income taxes. Additionally, tax assessors are required to factor in deed restrictions when making estimations for property tax purposes, and thus the lower assessed value will result in lower annual property taxes.[46]

These financial incentives, combined with a culture that values the historical heritage of previous generations, has made the historic preservation easement program successful. As of

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[43] Calder Loth, "Forty Years of Preservation: Virginia's Easement Program," accessed December 5, 2013, 1, http://www.dhr.virginia.gov/pdf_files/Easement%20Notes.pdf.
[44] Ibid., 1.
[45] Ibid., 1.
[46] Ibid., 1-2.

December 2013, the Commonwealth holds perpetual conservation easements on over 571 properties totaling over 36,500 acres. The DHR administers the easement program. A variety of donors are sources of easements, including private land owners, public entities, local governments, and nonprofit organizations. Today, a majority of conservations easements are acquired through federal or state grant programs that require placement of an easement as a condition of receipt of funding. Virginia's Civil War Sites Preservation Fund is a state grant program administered by DHR for the preservation of properties that are located within the boundaries of federally-recognized Civil War battlefields. Administered by the National Park Service, the American Battlefields Protection Program provides grant funding for preservation of significant battlefields associated with wars on American soil, including the American Revolution, the War of 1812, and the Civil War as well as wars from 16th century contact encounters to WWII actions in the Pacific. The federally-funded Farm and Ranchlands Preservation Program also occasionally is a source of grant funds.

As a result of programs like these, DHR partners with private individuals, local governments, and nonprofit organizations in acquiring historic preservation easements for important properties.[47] A collaborative effort is essential in the successful implementation of such a vast program, and the ability to preserve the integrity of so many historic sites is a result of such cooperation and attention to the Commonwealth's past. The contribution of the citizenry has been tremendous, and "the Commonwealth takes great pride in its many citizens who have voluntarily elected to preserve important historic resources through the easement program… These tangible acts of stewardship will enable a rich and irreplaceable legacy to be passed intact to future generations."[48]

[47] Department of Historic Resources Staff, December 2013.
[48] Ibid., 6.

Although the historic preservation easement program was officially commissioned by the Commonwealth in 1966, the concept of historical easements and preservation grew to include other approaches. Non-profits and private organizations, such as the Civil War Preservation Trust (CWPT), worked to obtain lands of historical significance in order to protect the areas. When the Commonwealth was able to ease land through preservation easements, the CWPT worked alongside the state and donated 208 acres in Spotsylvania County which were associated with the 1862 battle of Fredericksburg.[49] The contribution of private or non-profit organizations in the historic preservation effort has supplemented the state initiative for protecting those landmarks which are priceless icons of Virginia culture.

In addition to historic preservation easements, the General Assembly passed a law in 1977 which allowed "landowners to place farmland or forested property in a district, which then prohibited them from using land for any other use than agriculture or timbering. In return, landowners received a reduction in their local real estate taxes."[50] Within these districts, the Commonwealth introduced best management practices (BMP's) to promote smart farming to limit pollution and other negative externalities associated with agriculture. BMP's include soil testing to determine appropriate amounts and types of fertilizer for use on agricultural fields, constructing riparian buffers between fields and waterways to prevent direct deposition of farming-related chemicals, and the utilization of natural pesticide and crop management technologies to limit toxic runoff into the surrounding aquifers. Unlike preservation easements, which are permanent, these districts are under 5-year contracts with tax incentives and can be renewed.

[49] Peters, *Conserving the Commonwealth,* 52-53.
[50] Ibid., 54-55.

The historic preservation easement program is an important part of the conservation movement because of the vast amount of farmlands and forests attached to many of these easements. Country estates and manor houses are protected, as well as the lands and gardens associated with the buildings. As a result vast tracts of forest, fields, streams, and gardens are protected under the same laws which protect historic resources. The same individuals who are lobbying against urban expansion from an environmentalist perspective can find an ally in the historic preservationist who shares a common ideology: the negative externalities of urban development must be monitored or maintained. Otherwise the cost of economic development will no longer be justified against the loss of habitat and historical sites whose cultural significance cannot be replicated.

The concept intrinsic with the aforementioned programs is reflective of the conservation ideology of the era, that is, to preserve something priceless, it is necessary to isolate and sequester an area from the surrounding pressures of urban development, and maintain the area in its original splendor.

State Parks and Open Space Protection

In conjunction with the DHR's historic preservation easements and with temporary property districts, the Virginia Outdoors Foundation, which came into existence at the same time as the DHR (formerly VHLC), is responsible for approving and maintaining the Commonwealth's vast conservation easements. Under the umbrella of the Virginia Outdoors Plan, the VOF allows the Commonwealth "to accept private gifts of land, money, or other property that has been the beneficiary of the generosity of the citizens who have donated property to the Commonwealth

for the protection of natural beauty or historic values."[51] Also known as Open Space Easements, this program creates "a legal document made between a landowner and… the Virginia Outdoors Foundation. The easement limits present and future property development rights… and is bound to the deed of the property permanently."[52] Open Space Easements protect wooded areas, open fields, farmland, watersheds, hunting areas, and other areas associated with outdoor recreation. Like the preservation easements, there are tax benefits associated with placing a property under protection. These benefits include income tax deduction, Virginia state tax credit, and reduced property taxes. Like the preservation easements, the deed restrictions attached to protected open space easement lands can reduce the property value of the landholding, and thus the assessed tax value is reduced proportionately. Local property tax reduction is possible on natural lands if they meet the conditions set forth by local jurisdictions.[53] This program was designed to generate incentives for donating lands to the program without creating a tremendous cost in acquisitions on behalf of the Commonwealth. Additionally, leaving the owners of the property involved in land maintenance reduces the costs of upkeep. The VOF is funded through the state general fund and the Federal Land and Water Conservation Fund Grants.

The purpose for creating a program such as this came from a tremendous demand for green space following the economic boom in the 1950s. Issues such as nonpoint source pollution from field runoff into streams and rivers, poor air and water quality, and habitat loss to development demonstrated to the citizens of the Commonwealth and its legislators that a system should be put in place to limit the scope of development. Protecting watersheds, preventing unrestricted urban sprawl, and limiting pollutant access to watersheds were fundamental

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[51] Virginia Outdoor Recreation Study Commission, *Virginia's Common Wealth,* 62.
[52] Virginia Outdoors Foundation, "How We Work," accessed December 5, 2013. www.virginiaoutdoorsfoundation.org/protect.
[53] Virginia Outdoors Foundation, "Tax Benefits of Conservation Easements," accessed December 5, 2013. www.virginiaoutdoorsfoundation.org/protect/tax-benefits-of-conservation-easements/.

concerns at this time. Since its creation into law in 1966, the VOF has made tremendous strides in acquiring lands and protecting resources. This program has been immensely successful. Currently, the Commonwealth protects over 625,000 acres of land in its Open Space Easement program.

Virginia state parks are another important component to the Virginia Outdoors Plan and complement the efforts of the VOF and DHR. State parks have been present in the state since the 1930s, and the current size and variety of these parks is tremendous. When the state park system opened on July 15, 1936, however, it only consisted of 5 parks: Westmoreland, Seashore, Staunton River, Douthat, and Fairy Stone. As mentioned previously, increased economic stability after WWII led to an increase in urban sprawl and development in conjunction with more and more families entering urban employment. As a result, there was a decrease in green space combined with an increase in leisure time and access to transportation as the economy grew. Demand for expansion to the state park system was fueled by this demand and the associated legislation of the 1960s.

Funding for state parks and recreational services increased following the acceptance of the Virginia Outdoors Plan. Seen as a method for preserving land, offering recreational space, and promoting environmental management through education, state parks became an intrinsic part of the Commonwealth's culture and conservation efforts during this time period. The Virginia Department of Conservation and Recreation is responsible for managing and maintaining these areas, as well as establishing educational programs.[54] As of 2013, the Commonwealth has 36 state parks, and "no Virginia resident lives more than an hour's drive from one of [these] parks…. Parks encompass [over] 62,000 acres and five hundred miles of

[54] Department of Conservation and Recreation, "Virginia State Parks," accessed December 5, 2013. http://www.dcr.virginia.gov/state_parks.

trails… Nearly seven million visitors a year enjoy a range of recreational activities."[55] The Department of Conservation is managed under the Secretary of Natural Resources, along with the Department of Game and Inland Fisheries, the Department of Historic Resources, the Department of Environmental Quality, Virginia Marine Resources Commission, and the Virginia Museum of Natural History. All of these agencies directly serve the governor and the people of the Commonwealth, and share a common goal of protecting natural resources and providing educational resources. The landmark legislation of the Virginia Outdoors Plan created the framework for the contemporary system of environmental management in the state.

The Commonwealth of Virginia's Contemporary Environmental Problems

With technology, innovation, and development, the demand for energy, living space, and resources has become increasingly urgent in the past decade. The contemporary environmental picture for the Commonwealth of Virginia includes several key issues which reflect political, economic, and environmental justice components. Coal mining, uranium mining, hydraulic fracking, water pollution and the depletion of the Chesapeake Bay, greenhouse gas emissions and air pollution, and loss of habitat are a few of the issues threatening the Commonwealth's natural habitats.

Coal mining in Virginia's western mountains has been an activity practiced in this region for decades. Recently, a new type of surface mining has been implemented to reach buried coal seams. Mountaintop removal is a specialized practice of surface coal mining which involves the "removal of mountaintops to expose coal seams, and disposing of the associated mining

[55] Peters, *Conserving the Commonwealth,* 80-83.

overburden in adjacent valleys."[56] Current mining practices are regulated under the Surface Mining Control and Reclamation Act of 1977 which mandates hydraulic and topographic compliance in mining operations. Mining companies are required to return the landscape to its general contour following excavation, and to isolate wastewater in segregated lagoons to prevent soil leeching and groundwater contamination. Under the Clean Water Act Section 402, mining establishments are required to obtain permits to discharge into streams and waterways as a means for regulating the amount and type of materials introduced into a watershed.[57] While the federal government has overarching jurisdiction, state agencies have the ability to amend mandates and allow for increased dumping in waterways if they so choose. The size and scope of the federal regulatory agency is small enough that it must rely on state agencies for administration, and thus these agencies have increased influence.

The Surface Mining Control and Reclamation Act mandates that surfaces be returned to general contour, but it does not stipulate that ecological conditions be restored. As a result, forest fragmentation and changes in soil composition are common, altering the nutrient and mineral components in the surrounding environment. Additionally, species which are dependent on forested habitats are driven from mining locations and the habitat is lost. Decreased vegetation at higher elevations leads to increased stream flow and erosion downslope, exposing a greater downstream area to the negative effects of the mountaintop mines. The solubility of the excess minerals created by the mines introduces an unregulated amount of pollutants into streams and watersheds, making the permitting system marginally effective. Excess sediment acquired during the extraction process is deposited in nearby valleys, covering existing habitat and waterways and altering the drainage and ecological continuity of established surfaces.

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[56] "Mid-Atlantic Mountain Mining," United States Environmental Protection Agency, last modified March, 2012, http://www.epa.gov/Region3/mtntop/.
[57] Ibid.

From an ecological perspective, coal mining via mountaintop removal is extremely destructive and alters entire landscapes, eliminates habitats, and pollutes waterways at the site and downstream from mining operations. Leeching from waste lagoons and reduction of surface vegetation creates a greater volume of dissolved particulates within the adjacent watershed. Known as mining spoil, this waste rock and sediment is rich in sulfur, calcium, and other minerals and toxic metals. Additionally, depending on the surrounding soil composition, the mining spoil can greatly lower the pH of waterways, creating acidic conditions which diminish biodiversity and established species in the area. Excavation of surface mines changes the density and continuity of soil, reduces vegetation cover, and alters surface continuity. As a result, "the storage and deforestation associated with mining alter the hydraulic environment of watersheds disturbed by mining. The rate of weather of geologic materials is greatly increased while evapotranspiration is reduced."[58] Additionally, the fragmented particulates remaining after coal extraction are more soluble due to increased surface area and decreased continuity.

The EPA recognizes numerous environmental impacts associated with mountaintop mining. These include decreased aquatic biodiversity, increased base flow for streams located below mining watersheds, increased frequency of human-induced wetlands, fragmented forests, and decreased species biodiversity in post-closure mining locations.[59] Mining impacts water, land, and air ecology, and thus all species in surrounding areas are affected and these effects are widespread, dramatic, and long-term.

Environmental justice and human rights issues are another problem within the coal extraction industry. Coal mining regions in Appalachian states are distinct in that residents in

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[58] Dickens, P.S. and R. Minear and B.A. Tschantz, "Hydrologic Alteration of Mountain Watersheds from Surface Mining," *Water Pollution Control Federation* 61, No. 7 (July 1989), 1249.
[59] "Mid-Atlantic Mountain Mining," United States Environmental Protection Agency, last modified March, 2012, http://www.epa.gov/Region3/mtntop/.

mining towns are of considerably lower income levels than non-mining communities. Invariably, "socioeconomic disadvantage is a powerful cause of morbidity and premature mortality. Coal mining regions have higher unemployment and poverty rates compared with the rest of Appalachia or the nation, and this economic disadvantage appears to be a contributing factor to the poor health of the region's population."[60] In these communities, mining is the main industry, and the population relies on mine employment to maintain a standard of living. As a result of poor economic mobility and dependence on a single industry, citizens in these communities have little concern beyond satisfying basic economic requirements. Additionally, contesting the mining process or the industry's safety standards can jeopardize the livelihood of entire areas, thus making this option less realistic and desirable. Finally, lower income communities are notoriously less able to organize and enact change due to their very economic status and lack of additional resources.

According to a study published in the *Journal of Public Health Reports*, there is a direct correlation between higher mortality rates and increased coal mining activities in the Appalachian region. This study suggests that "poverty, low education level, smoking behavior, and environmental pollutants are among the factors that lead to higher mortality rates in coal mining areas. Higher mortality may also be due in part to conditions of elevated stress caused by economic disadvantage and environmental degradation."[61] The practice of mining coal exposes miners to a plethora of toxic chemicals. These chemicals and pollutants have lasting health consequences for individuals exposed for long periods of time. Within the Appalachian region, coal mining communities exhibit higher-than-average instances of heart, respiratory, and kidney

[60] M. Hendryx and M. M. Ahern, "Mortality in Appalachian Coal Mining Regions: The Value of Statistical Life Lost," *Public Health Reports (1974-)* 124, No. 4 (JULY/AUGUST 2009), 547.
[61] Ibid., 547.

disease, as well as an increased rate of lung cancer.[62] Water and air pollution are the main sources of these ailments.

Coal mining represents an industry and an energy generation practice which has widespread negative externalities. As stated previously, the process of mountaintop removal and other forms of strip mining creates toxic sediment which contaminates waterways and thus finds its way into the ecosystem. Contaminants are then transported across the state and can bioaccumulate in the species who live within the water and those who depend on aquatic organisms for food sources. Additionally, coal burned in coal-fired power plants produces toxic gasses which contribute to air pollution and global climate change.

Uranium mining is another issue which has been debated in the legislative arena over the recent General Assembly sessions. Uranium is a water-soluble radioactive metallic element used in the production of nuclear energy and nuclear weapons. Uranium deposits were discovered in Virginia in Pittsylvania County in the late 1970s at a site known as the Cole's Hill farm. At that time, a company known as Virginia Uranium Incorporated (VUI) secured leases of the property to mine the ore, and sought state approval to begin the extraction process. The Virginia Legislature in 1982 enacted a 30-year moratorium on uranium mining which prevented VUI from pursuing the issue further.[63]

In 2007, uranium prices began to rise and as the moratorium was set to expire in 2012, supporters of the project began to pressure lawmakers to support lifting the ban to allow mining in Virginia.[64] The environmental concerns for uranium mining involve the instability of the element and the precarious weather conditions which are common to that region of Virginia. As stated previously, uranium is water-soluble and radioactive and can persist in the environment

[62] Ibid.
[63] "Keep the Ban – No Uranium Mining in Virginia," Last modified 2013, http://www.keeptheban.org.
[64] Ibid.

for thousands of years. Generally mined in arid regions with sparse population, uranium mining "leaves behind massive amounts [of] radioactive and contaminated mill tailings….The Coles Hill operation would… generate about 29 million tons total of mill tailings, which would endanger human, animal, and plant life in the region for centuries."[65] The wet climate in Virginia increases the risk that flooding or severe rain/wind events would cause the removal of sediment from secure areas within the mining region.

Virginia's climate history has shown that the weather can fluctuate unexpectedly and that rainfall amounts can vary depending on the time of year and the current climate conditions. For example, in the past 40 years, nine major hurricanes have impacted Virginia, including Hurricane Camille in 1969, which deposited 31 inches of rain in central Virginia. Additionally, severe thunderstorms and rainfall events are common, and as the climate warms tornadoes are becoming more frequent. In April 2013, 30 tornadoes were recorded in Virginia alone.[66] As a result, any one of these weather events could release radioactive mine tailings which would persist in the environment with widespread human and biodiversity health effects.

Exposure to radiation from uranium mining and its negative externalities has been studied in other mining areas. The risks include "lung cancer, bone cancer, leukemia, birth defects, weakened immune systems, hormone disruption, and damage to DNA, the kidney and liver"[67] for those living near or working in mining areas. These risks will be transported downstream if a weather event infiltrates a mining site and causes mine tailing deposition into nearby waterways.

Even in arid climates there have been reports of groundwater contamination and

[65] Ibid.
[66] Ibid.
[67] Ibid.

disrupted ecosystems and toxic waste that can persist for millennia.[68] "Every uranium mine in the United States has required toxic cleanup; the worst have sickened dozens of people, contaminated miles of rivers, and requires the cleanup of hundreds of acres of land."[69] These risks only increase within the Commonwealth due to the aforementioned weather patterns. Supporters of uranium mining continue to pressure lawmakers to lift the ban and allow this industry into the state. The incentive lies in potential job and industrial revitalization in a traditionally poor area. Environmental groups such as the Sierra Club, Virginia Conservation Network, Southern Environmental Law Center, Virginia League of Conservation Voters, and the Piedmont Environmental Council have created an active coalition to oppose changes to the existing legislation, arguing that the cost of human and environmental health outweighs the potential financial benefits of another mining industry in the Commonwealth.[70]

Scientific studies following the push for lifting the moratorium have cited risks to waterways in the Virginia Beach and Hampton Roads area, should the Coles Hill site be mined. In addition to uranium, radon exposure is cited as a probable risk factor, and "the potential for adverse health effects increases if there are uncontrolled releases as a result of extreme events (e.g., floods, fires, earthquakes) or human error. The potential for adverse health effects related to releases of radionuclides is directly related to the population density near the mine or processing facility"[71] The City of Virginia Beach conducted a risk assessment study in 2011 and concluded that because the Coles Hill region is subject to heavy rains during different times of the year, it "raises the possibility of radiation flowing into downstream drinking water supplies,

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[68] "No Toxic Mining," Environment Virginia, Accessed November 22, 2013, www.environmentvirginia.org/programs/vae/no-toxic-mining.
[69] Ibid.
[70] "Keep the Ban – No Uranium Mining in Virginia," Last modified 2013, http://www.keeptheban.org.
[71] National Research Council of the National Academies, *Uranium Mining in Virginia: Scientific, Technical, Environmental, Human health and Safety, and Regulatory Aspects of Uranium Mining and Processing in Virginia* (Washington DC: The National Academy Press, 2012).

including Lake Gaston, which supplies drinking water to Virginia Beach and, indirectly, Chesapeake and Norfolk, if a catastrophic storm were to breach a tailings disposal cell."[72] In addition to Lake Gaston, the Kerr Reservoir and the Pea Hill Creek (location of the city's pump station) are among the most susceptible waterways.[73]

Supporters of uranium mining in the Commonwealth tout the economic potential of this large deposit, as well as the incentive for energy independence. Building a mine at the Coles Hill site will provide jobs for an economically disadvantaged region, and could revitalize the local economy through supportive resources and businesses. Estimates predict that the site will provide 1,052 jobs annually, generate $112.3 million in tax revenue, and have a total economic impact of $4.8 billion. Additionally, the United States currently imports 90% of its uranium for nuclear energy and military operations from other nations. Utilizing this resource can promote domestic energy independence, and create an economic incentive for business growth in a rural region of the Commonwealth.[74]

While these are important issues to consider, the aforementioned risk factors, coupled with the unstable weather patterns in the state, make lifting this moratorium an extremely risky endeavor. Additionally, the nuclear energy industry possesses its own risk factors, and promoting supportive industries can deter business incentives for developing clean and renewable energy sources. The true issue here revolves around the growing need for energy sources both locally and nationally, and the financial incentives to capitalize on non-fossil fuel sources. Lifting the moratorium would essentially put the Commonwealth at risk, and promote the expansion of risky energy endeavors.

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[72] City of Virginia Beach, "Virginia Beach Uranium Mining Impact Study, accessed December 5, 2013. www.vbgov.com.
[73] Ibid.
[74] Virginia Uranium Inc, "Job Creation and Economic Impact," accessed December 5, 2013. www.virginiauranium.com/jobs-for-virginia.

The uranium mining process involves extraction of ore through strip mining or open-pit mining, the processing of ore through the use of grinding and chemical processes to produce a byproduct known as yellowcake, and the reclamation process when extraction is complete. All three phases present potential environmental risks: strip mining destroys the natural contour of the land and disrupts habitat, while exposing uranium to the environment and the potential for leaching and spills. Creating yellowcake involves chemical reactions and potential runoff, and the reclamation process involves returning the area to a general contour but does not require a return to natural biological conditions. Additionally, the remaining radioactive mine tailings will need to be monitored and contained beyond the life of the mine.[75] These risk factors indicate that the cost of this industry can far outweigh the economic benefits.

Mining runoff, agricultural runoff, urban development pollution, and point source pollution from industries all combine to affect the health of the Chesapeake Bay. Virginia is one of six states which are within its watershed, and the health of the Bay and the issues contributing to its decline are perhaps the most important environmental issues being addressed in the Commonwealth because the negative externalities are so widespread, and the areas of improvement are equally immense. The Bay is the largest estuary in the United States, and stretches from Havre de Grace, Maryland, to Virginia Beach, Virginia. This 200-mile-long estuary has a vast watershed which includes parts of Maryland, Virginia, Delaware, Pennsylvania, Washington, DC, New York, and West Virginia. With over 17 million people living in these regions, the degree of pollution and the variety of potential sources makes the

[75] National Research Council of the National Academies, *Uranium Mining in Virginia: Scientific, Technical, Environmental, Human health and Safety, and Regulatory Aspects of Uranium Mining and Processing in Virginia* (Washington DC: The National Academy Press, 2012).

issue of Chesapeake Bay health a complex problem which requires collaboration between these states and those residing in the watershed.[76]

From an ecological standpoint, the Bay holds tremendous significance. Estuaries are the breeding grounds for countless marine species, as well as habitat for marsh grasses, water fowl, and other organisms. "The bay supports more than 2,700 species of plants and animals, including 348 species of finfish and 173 species of shellfish. [Additionally] the bay produces about 500 million pounds of seafood each year"[77] which makes it an important economic asset for those who depend on its biodiversity for their income. Tidal wetlands are another important component to the Bay ecosystem. These areas are important for breeding and proliferation of fish, birds, and other species including crabs and shellfish. Moreover, tidal wetlands offer an effective buffer between anthropogenic runoff and the waters of the bay, making them an essential component to water quality protection. At present, the bay supports about 284,000 acres of tidal wetlands.[78]

Despite its ecological and economic significance, the health of the Bay has been jeopardized by human activities. These human activities contribute to runoff and water pollution that is deposited into the Bay by its many tributaries. In addition, coastal development and habitat loss has depleted the natural barriers which can protect water from pollution, while altering the topography and ecology of the region. Finally, overfishing, biodiversity loss, and other commercial activities have threatened the established trophic systems of the Bay, and have affected those organisms which depend on creatures removed by commercial fishing industries. These factors combined have resulted in a water body which is being threatened from multiple sources.

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[76] "Facts and Figures, "Chesapeake Bay Program," accessed November 22, 2013, www.chesapekaebay.net/discover/bay101/facts.
[77] Ibid.
[78] Ibid.

Successful protection of the Chesapeake Bay involves the cooperation of all states within its expansive watershed. The states within the watershed need a combined pollution control effort in order to be effective due to the size and scope of the issue, and the number of citizens who live within and affect the watershed. A large part of this legislation involves cleaning up major rivers and tributaries which contribute substantial amounts of water to the Bay. In Virginia, these rivers include the James River and the Potomac River, both of which have substantial pollution control problems.[79]

Today, the Bay is protected by the Clean Water Act (CWA) and the Chesapeake Bay Agreement. The Clean Water Act is enforced by the United States Environmental Protection Agency (EPA). "The CWA gives the EPA the authority to set effluent limits on an industry-wide (technology-based) basis and on a water-quality basis… [and] requires anyone who wants to discharge pollutants to first obtain a NPDES [National Pollution Discharge Elimination System] permit"[80] Generally these controls come in the form of establishing Total Maximum Daily Loads (TMDL's) of specific nutrients or substances which are allowed to be deposited into a body of water per day per industry. Companies are responsible for obtaining permits which describe the individual TMDL's and substances in question. Establishing TMDL's and holding industries accountable when pollution exceeds the legal amount is a standard approach for decreasing the amount of additives which are deposited into the Bay by rivers and streams. A growing political movement to clean up the nation's waterways and natural resources has expanded public and

[79] Ibid.
[80] "Clean Water Act," USEPA, last modified December 17, 2012, http://cfpub.epa.gov/npdes/cwa.cfm?program_id+45.

private efforts to protect the Bay. Its protection and rehabilitation is essential for the stability of the region and associated industries.[81]

The Bay currently is considered to be in poor health according to several ecological indicators. While some improvements have been seen since the implementation of the Chesapeake Bay Agreement, "the Bay continues to have polluted water, degraded habitats, and low populations of many fish and shellfish species."[82] Depleted habitats contribute to threatened bay species as areas for breeding or sources of food are lost with these habitats. Tidal wetlands and submerged grass fields are essential for the breeding and feeding of many species. As of 2012, bay grasses occupy about 48,000 acres which is only 26% of a goal of 185,000.[83] Depleted populations of important species, many of which serve an economic purpose to associated fisheries, is a result of pollution, overfishing, lack of habitat, and lack of food. A few species under close observation include blue crabs, oysters, striped bass, American shad, and Atlantic menhaden.[84] Because these species are part of a complex bay ecosystem, the symbiotic relationship between different organisms and different stimuli is not fully understood. What is clear, however, is that in order to successfully rehabilitate the bay, efforts to prevent pollution and overfishing are required. Pollution prevention includes nonpoint source pollution from agricultural runoff, as well as point source pollution from industries and urban settings. Additionally, fisheries management to prevent overfishing of key species, or habitat loss from fishing methods, can improve populations. A collective effort on the part of state and local

[81] Interstate Commission on the Potomac River Basin, "Potomac River Timeline," accessed December 5, 2013. http://www.potomacriver.org/cms/index.php?option=com_content&view=article&id=96&catid=39&Itemid=57.
[82] "Bay Health," Chesapeake Bay Program, accessed November 22, 2013, www.chesapeakebay.net/track/health/bayhealth.
[83] Ibid.
[84] Ibid.

governments, as well as residents and fisherman, can hopefully continue to improve the health of the Bay and protect its biodiversity and economic importance.

Change for the Future

The Commonwealth's modern environmental movement has evolved to incorporate elements of its historical beginnings, combined with allusions to a future of sustainable development. A growing understanding of ecology and the complexity of earth's systems has changed the way environmentalists, business leaders, and lawmakers view the natural world and decide how to manage available resources. The environmental movement of the 1960s preached a gospel of preservation for scenic beauty and human enjoyment. Today, "a paradigm shift is underway, making the transition from 'command and control' perspectives… toward an ecosystem perspective that strives to balance human needs with environmental values."[85] Historically, environmental protection in the United States has dealt primarily with pollution control and clean-up, and not initial prevention. This end-of-pipe approach aims to monitor and mitigate industrial pollutants from the initial source, awarding industry-wide pollution allowances which enable companies to view violation fees as a cost of business. Additionally, cleanup of these pollutants generally involves removing the waste from one location and transferring it to another where it can be monitored and controlled. This method does not always fully eliminate the environmental and health risks associated with these substances, and the environment which was initially polluted is often damaged and does not return to its initial pristine condition.

[85] Gary J. Brierley and Kirstie A. Fryirs, *River Futures: An Integrative Scientific Approach to River Repair* (Washington: Island Press, 2008), 1.

A growing environmental consciousness has become less tolerant of this seemingly inevitable consequence of industrialization and modern conveniences. For the creative-minded, this dilemma exposes businesses to a potential new market designed to eliminate these pollution sources before they become common fixtures within an industry. "Green product development, which aims to prevent pollution from the beginning through product design and innovation, has thus emerged as an innovative and sustainable tool for solving today's environmental problems."[86] The market's motivation for change lies in a growing consumer demand for environmental design, and the willingness of the consumer to pay for these ethical advancements.

Environmentally Conscious Manufacturing (ECM) involves a "special class of advanced manufacturing practices…that include source reduction, recycling, pollution prevention, and green product design."[87] As mentioned previously, environmental product design aims to reduce the production of waste and promote efficient resource management to prevent environmental problems from the onset. This method operates on the sustainable development principle which encourages resource utilization in a manner that does not prevent the prolonged life of an industry, or affect the resource allocation to individuals and businesses alike. ECM represents a modern paradigm shift where business goals and environmental protection are no longer seen as opposing market forces. Traditionally, business practices and market ethics which valued profit above all else saw environmental regulation as a cost of business or an obstacle for unlimited growth. Pollution and environmental decline were not seen as financially relevant, thus

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[86] Chen, Chialin. "Design for the Environment: A Quality-Based Model for Green Product Development." *Management Science 47*, no. 2 (February, 2001), http://www.jstor.org/stable/2661573: 251.

[87] Florida, Richard and Atlas, Mark and Cline, Matt. "What Makes Companies Green? Organizational and Geographic Factors in the Adoption of Environmental Practices." *Economic Geography* 77, no. 3 (July 2001), http://www.jstor.org/pss/3594072: 209.

increasing government regulation was met with hostility from the financial sector. As consumer demand evolved to value clean air and water, to respect habitat and wildlife, and to slow the rampant development and pollution associated with economic growth, industries are forced to respond to their consumers. Presently, businesses are finding that environmental protection and economic growth are not mutually exclusive, but can be symbiotic. The resulting boom in green products has forced many companies large and small to make changes to remain competitive in America's fluid and evolving economy. Business in Virginia are beginning to capitalize on this growing environmental ethic, using ECM and other sustainability-based models upon which to design and market their goods and services. Dominion Virginia Power demonstrates this concept of ethical service design through the recently signed lease for offshore wind farms on Virginia's coast.

The issue of offshore wind energy is not new to the Commonwealth of Virginia. The continental shelf about 30 miles offshore from Virginia Beach is seen as an ideal location for the establishment of a wind farm. The gradual slope of the ocean floor, coupled with close proximity to a major shipping port and established transportation and energy infrastructure, makes this location ideal for the development of this renewable energy source.[88] In 2010, the Virginia Offshore Wind Development Authority was established through Title 67, Chapter 12, Code of Virginia, to help in the research and development process to capitalize on this resource. This enabling legislation stipulated that the Authority "is to facilitate, coordinate, and support development of the offshore wind energy industry, offshore wind energy projects, and supply chain vendors through" environmental research, legislative and regulatory review, and communication between state and local governments to facilitate the development of this

[88] "Offshore Wind Power," Dominion, accessed November 22, 2013, https://www.dom.com/about/stations/renewable/offshore-wind-power.jsp.

industry.[89] This authority reflects a growing concern for developing domestic energy sources within the Commonwealth and diversifying from dirtier sources such as burning fossil fuels.

In February 2011, Governor Bob McDonnell endorsed the initiative in a press conference in Norfolk, Virginia. McDonnell stated, "Cost effective development of Virginia's offshore wind resources is one important component of our overall effort to make Virginia 'The Energy Capital of the East Coast.' We must generate more of our electricity from our domestic resources," including coal, oil, natural gas, wind, and solar.[90] United States Energy Secretary Ken Chu and United States Secretary of the Interior Ken Salazar combined forces to create a plan for developing offshore energy, for expediting the permitting process, and for allocating federal funding for the exploration and implementation of this resource in the Commonwealth.[91]

In February 2012, the Bureau of Energy Management (BOEM) initiated the process of awarding offshore leases to energy companies interested in developing wind energy off the Virginia coast. The process involved a call for nominations and information, followed by an auction for the leases. McDonnell supported these initiatives and has invested time and money in bringing potential business leaders together to initiate a dialogue on the industry. In October 2012, the Governor's office endorsed the 2012 American Wind Energy Association Offshore Windpower Conference and Exhibition at the Virginia Beach Convention Center. This event was designed to promote interest in offshore wind energy while educating potential investors in the growing market.[92]

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[89] "Virginia Offshore Wind Development Authority," James Madison University, accessed November 22, 2013, http://wind.jmu.edu/offshore/vowda/index.html.
[90] "Statement of Governor Bob McDonnell on Federal Offshore Wind Energy Announcement, accessed November 22, 2013, http://www.commerce.virginia.gov/News/viewRelease.cfm?id=594.
[91] Ibid.
[92] "Governor McDonnell Welcomes AWEA Offshore Windpower Conference to Virginia Beach," accessed November 22, 2013, http://www.governor.virginia.gov/news/viewRelease.cfm?id=1452.

Dominion Virginia Power, the Commonwealth's largest energy company, showed considerable interest in the project and subsequently entered into the auction process to become a potential candidate for holding these leases. On September 4, 2013, the energy company won the right to develop 112,800 acres in the Atlantic Ocean for wind farms in an auction conducted by BOEM. This lease was signed on October 11, 2013, with a winning bid of $1.6 million. Estimates of the potential energy output of the farm stipulate that the acreage could generate 2,000 megawatts of energy which can power 500,000 to 700,000 homes annually.[93] These wind farms could "reduce carbon dioxide emissions by 97.2 million metric tons annually, [which is] equivalent to 17.7 million cars or 52 coal-fired power plants."[94] Dominion Virginia Power estimates that it will take 10 years to adequately develop and construct the wind farm and acquire the necessary permits and approvals from the federal government.

This process illustrates the financial benefit of sustainable growth, and the growing interests in traditional industries to diversify to include an environmental ethic in their long-term growth and development projections. While Dominion Virginia Power is a leader in the production and burning of fossil fuels in the state, the financial investment and incentive for including green industries comes from two sources. First, fossil fuels are nonrenewable and the company understands that to remain relevant and competitive in an open market it must develop other sources of energy before the decreasing abundance of fossil fuels beings to impact energy output.[95] Additionally, a growing ethically conscious customer base has shown considerable interest in the implementation of cleaner energy initiatives which in turn motivates companies to

[93] "Dominion Power Signs Offshore Wind Lease," Richmond Times Dispatch, accessed December 2, 2013, http://www.timesdispatch.com/business/economy/dominion-virginia-power-signs-offshore-wind-lease/article_9e683a8a-2557-5d9b-890e-27790ab49215.html.
[94] "Virginia Offshore Wind Coalition," accessed December 2, 2013, http://www.vowcoalition.org/.
[95] "Renewable Generation," Dominion, accessed December 2, 2013, https://www.dom.com/about/stations/renewable/index.jsp.

adapt with the customer demand and produce products and services in a more sustainable manner. For that reason, Dominion previously introduced a program which allows consumers to participate in a program to purchase energy from renewable sources. The program is known as Dominion Green Power, and reflects a consumer desire for an ethical product.

There is still considerable debate over the cost of constructing and producing energy from wind farms, but the dialogue has been opened and the process initiated. While Bob McDonnell and Dominion support the use of fossil fuels and other carbon-based, finite sources of energy, the fact remains that a major step has been taken to invest considerable time and energy into developing a renewable source for widespread commercial energy production. The success of this project could allow for the expansion of clean energy development which could in turn aid the Commonwealth in decreasing its carbon footprint and becoming a leader in green energy.

Final Thoughts

Despite this positive trend in environmental awareness within the Commonwealth, there is still room for growth and improvement. In a 2008 article in *Virginia Business,* journalist Doug Childers focuses on carbon dioxide emissions. According to Childers, "From 1990 to 2004, [Virginia's] emissions increased by 34% – or 32.1 million metric tons – a rate nearly twice the national average."[96] This increase ranked Virginia 13th for the nation's top carbon dioxide percentage increases. The DEQ ranked Virginia 17th overall for greenhouse gas emissions.[97] The main sources of these gasses come from power plants (36%) and transportation (31%), suggesting that a focus on greener energy and higher fuel efficiency standards could abate this rampant use of fossil fuels. In the fall of 2007, Forbes magazine ranked Virginia as 23rd among

[96] Doug Childers, "Playing Catch-up," *Virginia Business*, April 2008, 30.
[97] Ibid.

the greenest states.[98] These numbers suggest that the Commonwealth has room for improvement in terms of pollution abatement and control. Looking back at the commons ideology, the issues mentioned here reflect the fundamental clash between the increased demand on the environment as nations develop and as the global population increases. In order to maintain a symbiosis between the state of the natural world and the quality of human services, it is essential that sustainable development, ECM, clean energy, and innovative methods and farming techniques be implemented. The nature of the environmental movement is such that the collective efforts of all individuals are needed to make lasting and effective changes.

[98] Ibid.

Environmental Conservation Timeline

- **June 15, 1936:** Virginia Parks System opens with Seashore, Staunton River, Westmoreland, Douthat, Fairy Stone, and Hungry Mother State Parks. These parks were built under the New Deal-era Civilian Conservation Corps program.[99]
- **1940:** Bear Creek Lake State Park established in Cumberland County
- **July 1, 1946:** "Virginia Adopts the State Water Control Law, one of the country's first statewide efforts to control water pollution. The law also establishes the State Water Control Board."[100]
- **1952:** Virginia Resource Use Education Council is established.
- **1962:** Pocahontas State Park established in Chesterfield County.
- **1963: "**US Congress approves the Clean Air Act. Significant amendments are passed in 1970, 1977, and 1990."[101]
- **July 1, 1966: "**Virginia adopts the Air Pollution Control Law, which establishes the Air Pollution Control Board."[102]
- **1966:** Virginia Historic Landmarks Commission created; as part of the Virginia Outdoors Plan, the VHLC eventually became the Virginia Department of Historical Resources.
- **1970: "**A pollution response program originally called Hazard Alert Team Standby begins under the State Water Control Board to address water pollution complaints statewide."[103]
- **April 22, 1970:** First Earth Day
- **1970:** Governor Linwood Holton of Virginia establishes a state Council on the Environment.
- **December 2, 1970:** Environmental Protection Agency formed
- **1972: "**The Federal Water Pollution Control Act is adopted. The law is amended as the Clean Water Act in 1977."[104]
- **1972:** Virginia's Endangered Species Act becomes law
    - **Amended in 1972[105]**
- **July 1, 1972:** "Virginia establishes the Council on the Environment as a state agency to coordinate the implementation of the Commonwealth's environmental policy."[106]
- **July 1, 1973: "**Virginia adopts the Ground Water Act, which authorizes the State Water Control Board to designate ground water management areas."[107]
- **October 21, 1976: "**Resource Conservation and Recovery Act, the first comprehensive amendment of the federal Solid Waste Management Act of 1965, takes effect and is administered by the EPA."[108]

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[99] Peters, *Conserving the Commonwealth,* 76-77.
[100] Department of Environmental Quality., *An Environmental History,* 1-18.
[101] Ibid.
[102] Ibid.
[103] Ibid.
[104] Ibid.
[105] Karen Terwilliger, *Virginia's Endangered Species* (Blacksburg: The McDonald and Woodward Publishing Company, 1991), 5.
[106] Department of Environmental Quality, *An Environmental History,* 1-18.
[107] Ibid.
[108] Ibid.

- **December 11, 1980: "**The federal Comprehensive Environmental Response, Compensation and Liability Act, known as CERCLA or superfund, takes effect."[109]
- **May 21, 1981: "**The first Virginia hazardous waste management regulations go into effect based on federal RCRA regulations."[110]
- **December 9, 1983: "**Virginia joins other jurisdictions in the signing of the first Chesapeake Bay Agreement, calling for a unified effort to improve the health of the Bay."[111]
- **1986:** "Virginia establishes the Coastal Zone Management Program to protect and manage coastal areas in the Commonwealth."
- **July 1, 1986:** "The Virginia Department of Waste Management is formed under the new secretary of natural resources. The Waste Management Board also is established."[112]
- **1987:** US Fish and Wildlife Service creates state endangered species list.[113]
- **1988: "**Virginia adopts the Chesapeake Bay Preservation Act."[114]
- **1988:** Department of Conservation and Historic Resources Recognized.
- **July 1, 1989: "**Legislation takes effect that establishes a statewide recycling mandate of 25 percent of municipal solid waste by 1995."[115]
- **October 9, 1991: "**EPA regulations governing management of municipal solid waste take effect."[116]
- **1992:** "EPA establishes the National Pollutant Discharge Elimination System policy to bring municipal combined sewer overflows into compliance with the Clean Water Act."[117]
- **April 1, 1993:** VA DEQ formed.
- **July 1, 1993:** "Virginia pollution prevention Program is established at DEQ."[118]
- **June 2000: "T**he Chesapeake 2000 Agreement is signed."[119]
- **September 29, 2000: "**EPA authorizes Virginia's RCRA Corrective Action program."[120]
- **July 1, 2005: "**State legislation establishes the Virginia Environmental Excellence Program to encourage business and industry to go beyond basic environmental compliance."[121]
- **October 11, 2013:** Dominion Virginia Power signs a lease to develop 112,800 acres 30 miles off of the Virginia coast for wind farms.

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[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Ibid.
[113] Terwilliger, *Virginia's Endangered Species*, 5.
[114] Department of Environmental Quality, *An Environmental History,* 1-18.
[115] Ibid.
[116] Ibid.
[117] Ibid.
[118] Ibid.
[119] Ibid.
[120] Ibid.
[121] Ibid.

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