

Environment and Health at a Crossroads

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North Carolina is at a crossroads with respect to our health and our environment. The road behind has brought cleaner air, cleaner water, and better health, but also serious problems. The road ahead requires critical and urgent choices based on new understanding, increasing risks, and more complex problems. Wise leadership and strong citizenship are needed now more than ever.

Introduction

David Howells, the first director of the University of North Carolina (UNC) Water Resources Research Institute and the chair for several years of the North Carolina Environmental Management Commission, wrote in 1990 about clean water and health: “The road ahead will be as demanding as the road behind, and the state’s commitment to clean streams must continue” [1]. His statement applies today with greater force, and not just for water, but for clean air as well as the health of our land resources. Environment and health are indeed at a crossroads, in North Carolina and beyond.

“Crossroads” in this context has two meanings. The first meaning is an intersection, a place where things come together. For example, as the writer, naturalist, and producer Tom Earnhardt has pointed out, North Carolina is a crossroads of the natural world [2]. Crossroads also means an extraordinary time, a point of decision calling for immediate attention and action, where a community, confronted with diverging roads, must set a direction and choose a course that will make all the difference.

Our state straddles the 35th parallel and stretches 500 miles from the mountains to the sea. It includes 17 river basins and is a cradle of biodiversity. These features have made the state a popular place to live, work, visit, and recreate.

The US Census Bureau has estimated the state’s 2020 population at more than 10,600,000 people, an increase of more than a million from 2010 [3]. Our rapid population growth has spurred an even faster rate of urban sprawl and with it the fragmentation of open space and natural resources in many areas [4]. For much of our history, we have taken our abundant natural resources and clean environment for granted and caused them to decline, degrade, or disappear. The road we’ve had to travel to respond to these declines, degradations, and disappearances has been

demanding. We have made progress on some issues, but little or none on others. Today the road ahead is fraught with urgent and significant threats, some old and some new, to our health and well-being. Our state’s journey to this 2021 crossroads of environment and health, with all its risk and all its potential, is reflected in the stories of water and health, and of air and health, in North Carolina.

Clean Water and Health in North Carolina

The words of the author Barbara Kingsolver provide an eloquent summary of North Carolina’s history of managing its water resources: “Water is life...our deepest dread is the threat of having too little moisture—or too much” [5].

For most of North Carolina, persisting into the early years of the 20th century, bad wells, foul yards, privies, and cesspools were the common lot of rural and urban North Carolinians. “Bad water” was seen as one of the most efficient agents in spreading disease. As early as 1937, a state agency reported that the rapid development of urban centers and industries was polluting our water supply, eroding the soil, and becoming a danger to public health.

Similar problems across the country set the stage for water pollution control legislation on both the federal and state levels, incrementally through the 1950s and 1960s, and following the first Earth Day in 1970 with landmark legislation such as the 1972 federal Clean Water Act and comparable state legislation [6]. In North Carolina, concerns about the health of the state’s waters and the need for an adequate and healthy water supply to support a growing population led both to the construction of new reservoirs and to the protection of groundwater through initiatives such as the Central Coastal Plain Capacity Use Area [7].

The years since 1972 have seen the implementation and enforcement of controls on municipal and industrial wastewater treatment and other “point” sources of pollution. In recent decades, however, nonpoint source pollution has become a leading cause of water quality degradation in North Carolina. Nonpoint source pollution is caused by stormwater that gathers pollutants from roads, farm fields,

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and other surfaces and contaminates streams, rivers, and groundwater. Addressing nonpoint source pollution requires comprehensive water management planning on a broad scale and close collaboration between local, state, and federal governments and the private sector.

North Carolina has worked to address nonpoint source pollution by providing grant funding for planning and restoration projects and implementing regulatory strategies to restore key watersheds in North Carolina [8]. These strategies include innovative programs to address nonpoint source pollution in the Tar-Pamlico and Neuse estuaries as well as Falls and Jordan lakes [8]. The strategies also include the establishment of the Clean Water Management Trust Fund (now the North Carolina Land and Water Fund), which has conserved over a half-million acres and protected or restored 3,000 miles of streams and rivers [9], as well as other conservation trust funds.

Tensions remain, however, among competing uses of the state's waters for drinking water; commercial, agricultural, and recreational activities; and ecosystem protection. Industrial activities can still create downstream threats, as evidenced by releases of per- and polyfluoroalkyl substances from the Chemours facility on the Cape Fear River or coal ash releases due to infrastructure failures or flooding in extreme weather [10, 11]. Nutrient concentrations in estuaries or freshwater lakes can create harmful algal blooms that threaten both human health and aquatic life [12, 13]. Disadvantaged communities across North Carolina still struggle with the financial demands involved in providing safe drinking water and effective wastewater treatment [14, 15]. As it continues to grow, North Carolina faces critical and pressing choices in the years ahead about how to equitably address and resolve these tensions.

Clean Air and Health in North Carolina

Through the 19th century and the first half of the 20th century, many North Carolinians saw smokestack emissions as signs of economic prosperity. Though North Carolina happily had no documented disasters such as the Donora, Pennsylvania smog of 1948, by mid-century there was sufficient concern that in 1951 the North Carolina General Assembly passed G.S. 143-211, a law that declared it to be the public policy of the state to provide for the conservation of its water and air resources [16].

Further progress awaited the passage of the landmark federal Clean Air Act Amendments of 1970 [17]. This innovative statute sharply increased the federal role in setting national clean air standards and technology-based controls for cars and new stationary air pollution sources. It also gave the federal government far stronger enforcement powers and enabled citizens to sue in federal court for violations of clean air standards. Federal support for research and monitoring of air quality also expanded rapidly. At the same time, the new act required states to adopt plans for areas with polluted air and to take over, under their own rules, responsibili-

ties for permitting and enforcement outlined in federal law.

Since the early 1970s, the Division of Air Quality has relied on both federal rules and state-specific ones to meet North Carolina's particular challenges. At different times, six areas of the state (mostly urban) did not attain ambient air quality standards for ozone, carbon monoxide, or particulate matter. The good news is that as of early 2021, all of North Carolina is in attainment with existing ambient standards for criteria air pollutants. Innovative and proactive state initiatives, such as the North Carolina Clean Smokestacks Act of 2002, contributed significantly to this accomplishment [18]. This act required North Carolina's major coal-fired power plants to reduce emissions of nitrogen oxides (NO_x) by 77% from 1998 to 2009 (77% reduction) and sulfur dioxide (SO₂) by 73% from 1998 to 2013 [19]. Co-benefits of the act included reductions in particulate matter, mercury, and CO₂ as inefficient coal-fired units were replaced with cleaner natural gas units.

Nevertheless, it would be a grave error to conclude that all health concerns about air pollution have been addressed. In particular, the 2020 decision by the Environmental Protection Agency (EPA) to retain the existing standard for particulate matter has come under severe criticism as ignoring the best available science [20]. A recent study published in the journal *Cardiovascular Research* suggests that the incidence and severity of COVID-19 can be related to ambient air pollution [21]. The monitoring networks used to determine attainment status are valuable but are not designed to identify localized problems. Fenceline communities can experience air pollution problems that are hard to detect and measure. Also, few monitors measure exposure to non-criteria air pollutants such as formaldehyde, methyl bromide, ammonia, hydrogen sulfide, mercury, or per- and poly-fluoroalkyl substances, all of which have been of concern in North Carolina.

We also face tremendous environmental and health concerns from the most ubiquitous air pollutants of all—greenhouse gases. Health risks in North Carolina from climate change were extensively discussed in the September-October 2020 issue of the *North Carolina Medical Journal*. In addition to their direct benefits, efforts to avert climate change and increase use of renewable energy have significant collateral benefits, reducing conventional and hazardous air pollutants and creating jobs and economic opportunity.

Conclusion

Although it has been 50 years since the first Earth Day and 30 years since Dr. Howells wrote his observations, they apply with even greater force today to our 2021 crossroads moment for environment and health. The problems have grown more complex, the road ahead will be demanding, and the state's commitment to conserving and protecting health and the environment must continue and accelerate.

Since 1990, North Carolina has been hit by extreme

weather events and changing environmental conditions. Destructive hurricanes such as Floyd, Frances, Ivan, Matthew, Florence, Michael, and Isaias represent such events, but flooding from non-tropical storms, wildfires, landslides, heat waves, droughts, tornadoes, and rising seas put all portions of the state at risk, and these risks will continue to increase. Such events affect the health, the environment, and the economy of the state [22]. These events demonstrate the present risks of climate change, risks which promise to worsen before they improve. Consider one key finding from the North Carolina Climate Science Report issued last year: “Our scientific understanding of the climate system strongly supports the conclusion that large changes in North Carolina’s climate, much larger than at any time in the state’s history, are very likely (90–100% probability of outcome) by the end of this century” [23].

Against a background of significant progress, new understanding, increasing risk, and more complex problems, we find ourselves, our environment, our health, and our well-being at a crossroads here in North Carolina, facing what Dr. Martin Luther King, Jr., called, in the context of civil rights, “the fierce urgency of now.” Now is the time to find the leadership, partnerships, innovations, and commitment to do what our state constitution says needs to be done: conserve and protect the state’s lands and waters for the benefit of all its citizenry; acquire and preserve park, recreational, and scenic areas; control and limit the pollution of our air and water; and preserve as the common heritage of this state its forests, wetlands, estuaries, beaches, historical sites, open lands, and places of beauty [24]. NCMJ

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