



State of the Lehigh Valley 2021



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State of the Lehigh Valley 2021

Letter from the Director

Dear Community Members of the Lehigh Valley,

We are excited to share the *State of the Lehigh Valley: Community Trends at a Glance*. This year's theme, Environmental Justice in the Lehigh Valley, draws our attention to the ways in which poor or minority communities in our region may be disproportionately subject to negative environmental impacts. Thinking about environmental injustice challenges us to consider the intersections between environmentalism, sustainability and equity.

In the pages that follow, readers will learn about the effects of climate change on the Lehigh Valley and of major milestones and continuing obstacles that remain in achieving environmental justice nationally and in our region. They will also read about two environmental justice concerns that directly affect the Lehigh Valley: radon gas education and communication not being as readily available to renters in Allentown, the majority of whom self-identify as Hispanic; and the lack of greenspace and trees in our urban cores, resulting in dangerous heat islands.

Recognizing patterns of environmental injustice that are specific to the Lehigh Valley can ensure policies to address and mitigate this type of inequity are designed with our unique community in mind. The members of the Lehigh Valley Research Consortium and authors and editors of the *State of the Lehigh Valley* hope this report will serve as a starting point for community-based conversations – be they face-to-face or virtual – on the ways we can achieve and maintain environmental justice for all members of our region.

Thank you for your support and participation.



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Raising Radon Awareness and Communicating Risk: Challenges and Solutions in a Bilingual Population

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Environmental radiation exposure can pose significant health risks that may ultimately lead to cancer. Naturally occurring radiation from space, known as cosmic radiation, and radiation from the sun, known as ultraviolet (UV) radiation, are unlikely to cause severe health effects in low doses. On the other hand, radon, a naturally-occurring radioactive gas that is released from rocks and soil can seep through cracks in foundations and slabs and become trapped inside homes, schools, and workplaces. Radon gas levels can rise to levels that pose danger to human health. Specifically, when inhaled, radon causes lung cancer. In fact, this odorless, colorless, tasteless gas is the second leading cause of lung cancer after smoking and is responsible for over 21,000 lung cancer deaths in the US every year (EPA Citizen's Guide, 2016). Residents living in the Lehigh Valley are at increased risk of exposure to unusually high levels of this radioactive gas (PA DEP). The only way to know if radon is present at unhealthy levels is to test for it. Mitigation of indoor radon can be accomplished by the installation of a radon exhaust system; however, many residents are unaware of the risk of radon gas exposure, or are unable to take action to mitigate.

It is estimated that 1 in every 15 homes in the US has elevated radon levels above the recommended action level set by the US Environmental Protection Agency (USEPA). In Pennsylvania, 49 out of 67 counties report higher than normal levels of indoor radon (PA DEP). The Lehigh Valley has some of the highest levels of indoor radon in the entire country. In fact, the highest level of indoor residential radon gas ever recorded was located in Center Valley, PA in November 2016 (Tatu, 2016).

Testing of neighboring homes revealed exceedingly high radon levels as well. This was alarming, but not surprising. The Lehigh Valley sits atop a granite rock formation known as the Reading Prong, which likely explains the increased radon levels in this geographical location. Because radon is a gas that is invisible and undetectable by taste or smell, the only way to know if it is present at dangerous levels is to test for it.

Testing is inexpensive and easy. A simple do-it-yourself test kit can be acquired at no cost from the PA Department of Environmental Protection Radon Division, or purchased at a hardware store, and can be used to determine radon levels in the home. After 48-72 hours of exposure to the indoor air, the test cartridge is mailed to a lab for analysis and determination of the radon level. Certified radon testers can also provide this service for a fee. The USEPA has set a level of indoor radon above 4 pCi/L (picocuries per liter) as an "action level", meaning that if the radon levels meet or exceed 4 pCi/L, then action in the form of mitigation should be taken to minimize cancer risk (EPA Citizen's Guide, 2016). It is important to note that this action level was established based on technological feasibility, and not health risk. Since radon is a carcinogen, there is no level that is considered "safe" and there are lung cancer risks associated with levels lower than 4 pCi/L. Mitigation includes sealing the foundation for holes and cracks, and professional installation of an exhaust system that moves the radon gas from the foundation (or slab) through a pipe and out into the ambient air.

In Pennsylvania, this installation requires the services of certified radon mitigators (PA DEP). The one-time cost for installation of exhaust systems typically ranges from \$800-1500 depending on the size of the building. Some municipalities in PA, including the city of Easton, have passed building codes requiring the incorporation of depressurization systems during the construction of homes (PA DEP; City of Easton). However, in the instance of existing homes, the approach is based on strategic messaging, making communication across cultural and linguistic barriers critical in diverse communities.

Communicating environmental health risks is a crucial component of radiation protection and the public's understanding of radiation risks and benefits. Risk communication becomes even more complicated when considering cultural and language differences. In the US, many diverse communities face risk communication challenges. In Allentown, a city where nearly 55% of the population identifies as Hispanic, and 43% speak a primary language other than English, the average indoor radon level is 5.8 pCi/L (in those households where testing has been conducted). (City Data; PA DEP). However, our research, funded by the Harry C. Trexler Trust, has shown that there is a significant disparity between those who self-identify as Hispanic and those who self-identify as non-Hispanic in regards to radon awareness and knowledge. A 2017 survey of over 550 Allentown residents living in 5 different zip codes in the city, (238 self-identified as Hispanic) showed that only 39% of Hispanics had ever heard of radon, compared to 83% of the 313 non-Hispanic respondents. Even when demographic categories (age, gender, education level, annual income level, and zip code) were adjusted for there were still statistically significant differences between Hispanics' and non-Hispanics' awareness and knowledge of radon (Cronin, Thrush, Bellamy, Russell, and Locke, 2020).

Because Allentown has a substantial number of people who self-identify as Hispanic, and recognizing that Allentown dwellings are more likely to have radon levels above the action level, public health protection from radon's risks is likely to be strongly influenced by the extent to which the Hispanic population is aware of the health hazards of radon, and understands that radon testing and mitigation are required when radon levels are above 4pCi/L. The first step in raising awareness is to provide messages in Spanish regarding the link between radon and lung cancer, as well as the home testing process and mitigation procedures. On a state level, the PA Department of Environmental Protection Radon Division has recently updated radon information available in Spanish on its website (PA DEP Radon Division). On a local level, radon risk information, including videos on how to test, is now available in both Spanish and English on a website created by my research students at Muhlenberg College (www.radonlehighvalley.org). In addition, we launched a radon information campaign funded by the PA DEP Radon Division in both English and Spanish using LANTA buses and bus shelters as the "messengers" in January 2020. Buses carried banners that read "Radon causes lung cancer. Test your home. Save a Life." and included the radonlehighvalley website address. Inside the buses, posters in both English and Spanish were displayed above the seats (Fig.1). At the bus shelters, full-sized posters in both English and Spanish were displayed (Fig. 2).

Renters are a vulnerable subpopulation disproportionately affected by lax radon policies and require a slightly different risk communication strategy. Among Allentown residents, 61% are renters and the majority identify as Hispanic (City Data, 2019).



Figure 1: Radon signage (English version) inside and outside LANTA buses



Purchasing a home provides an opportunity to learn about radon risk and testing. Though there are no laws that require radon testing and mitigation in homes in Pennsylvania, nor is testing required to sell a home, there is a radon disclosure statement on most home purchase and sales transactions. If the house has been tested, the result must be revealed. While buyers can request that a test be done, it is not legally required. Homeowners have likely seen a radon disclosure statement in their buyer's contract, but renters have likely not. In our research, we found that there was a statistically significant difference in homeowner status between Hispanics and non-Hispanics in Allentown, with the majority of renters identifying as Hispanic, and that 85% of respondents who were homeowners were more likely to have ever heard of radon compared to 15% renters (Cronin et al., 2020).

Messages developed for renters that raise awareness of radon must be accompanied by guidance about what to do next, as our data suggest that even when renters have heard of radon, they feel powerless to do anything about it. Given that Hispanics comprise the majority of the renters in Allentown, it is important to design messages in both Spanish and English that not only raise awareness about the serious health risks associated with radon, but also provide guidance on what they can do to keep themselves and their families safe.

Tenants' associations need to advocate for policies that require landlords to test and disclose radon levels in rental properties prior to leasing. At the city level, Allentown managers need to require radon testing by certified testers of all rental properties and if levels are high, should require landlords to install radon mitigation systems. Housing authorities need to be as vigilant about radon testing and mitigation as they are about lead. These policies are not unprecedented. There are a number of states that require landlords to take responsibility for protecting tenants against environmental hazards, including radon (AARST Radon Resources, 2022).

In addition to stricter policies for landlords, other Lehigh Valley municipalities should follow Easton's lead and require all new housing codes to include radon resistant new construction to alleviate the need for installation of radon exhaust systems after the house has been built, and to add an additional barrier to radon gas seeping in through the foundation. Lastly, radon testing and mitigation should be a requirement for all real estate transactions to ensure that the indoor air is safe and healthy in the home.

Protection from radon exposure is a multi-step process that requires both political and social will. Radon is the one environmental carcinogen that can be mitigated easily and inexpensively. Policies and laws that require testing and mitigation in day cares, schools, homes, and businesses will eliminate the thousands of lung cancer deaths caused by radon exposure each year.



Figure 2: Radon signage (English version) inside and outside LANTA bus shelter

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Urban Heat Islands and Environmental Injustice in Allentown

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Multiple forces are focusing more attention on two longstanding challenges in urban neighborhoods: excessive heat and the lack of greenspace. On the one hand, public opinion polls indicate rising concern for the environment and about climate change: two-thirds of Americans feel that the environment “should be a top priority for the president and Congress” and over half now feel the same about climate change (Pew Research Center, 2020). On the other hand, local, national and global activism since the summer of 2020 (in the wake of George Floyd’s death) has raised awareness about and fueled action to dismantle racial inequities and environmental injustices. This has brought global climate change local, and made connections between historic discriminatory practices, ongoing patterns of racial segregation and neighborhood disinvestment, and environmental harms and health consequences. At the center of this are urban heat islands and how their effects are disproportionately felt in “redlined” neighborhoods and by people of color.

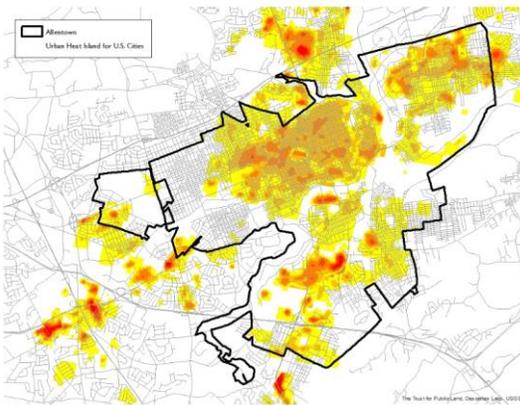
Urban heat islands are those parts of cities that are “consistently warmer, in terms of surface temperature, air temperature, or both,” than nearby urban, suburban and rural areas (Saverino et al., 2021). In the summer months, these warmer temperatures can become extreme and pose a serious threat to residents’ health.

In fact, this type of excessive heat “was the single largest cause of weather-related fatalities between 1986 and 2017,” killing as many people as flooding and hurricanes combined (Wilson, 2020). As temperatures rise with the effects of climate change, this situation is likely to get even worse.

For the most part, urban heat islands can be traced to two overlapping causes: 1) intense industrial, residential, or mixed-use development, and 2) the lack of greenspace or trees (Saverino et al., 2021). Multiple studies have found proxies for these conditions – such as an area’s percentage of impervious surfaces and percentage of canopy cover – “to be the two strongest variables associated with afternoon temperature,” higher temperatures, and susceptibility to heat waves (Saverino et al., 2021; Grove et al., 2018). The connection makes sense: materials like asphalt and concrete (prevalent in roads and parking lots) absorb and store heat, far more of it than sod or grass (United States Environmental Protection Agency, 2021). Places with more of the former, particularly those that lack the cooling effect of trees and other greenery, will be hotter.

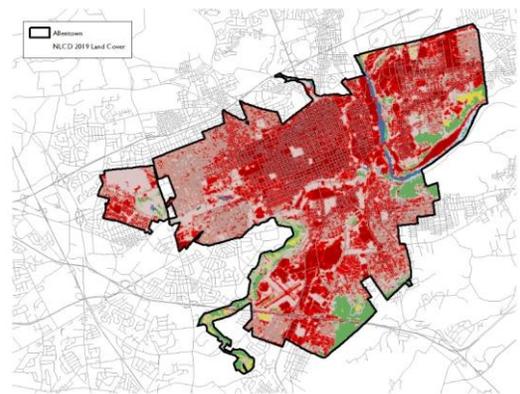
That is exactly the pattern evident in Allentown. Data on area temperatures show significantly warmer ones in the city’s core neighborhoods (see Map 1).

Map 1: Urban Heat Islands in Allentown



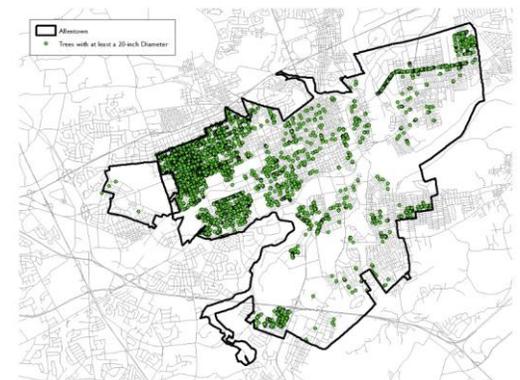
Source: Trust for Public Land, Descartes Labs, and USGS.

Map 2: Land Cover (% Impervious Surface) in Allentown



Source: National Land Cover Database 2019, author.

Map 3: Location of Mature Trees (20-inch+ Diameter)



Source: City of Allentown, Samantha Roth, author.

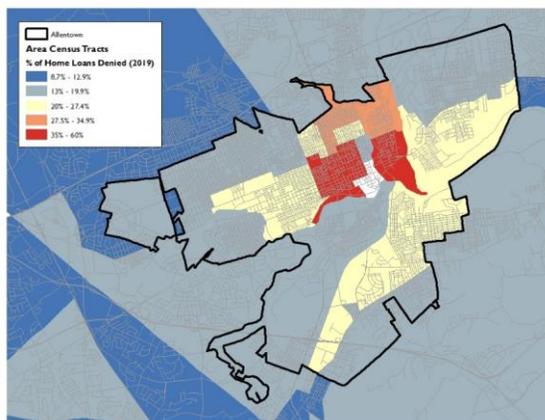
These heat islands overlap almost perfectly with the city’s highest concentrations of impervious surfaces, and lowest concentrations of greenery (see Maps 2 and 3).

The patterns in these maps closely mirror the patterns of other people- and place-based indicators across Allentown, from property values and conditions, to resident incomes and poverty. In fact, after impervious surfaces and canopy cover, the largest predictors of heat island effects in a given location are historic patterns of investment and disinvestment, and residents’ socioeconomic status (Saverino et al., 2021). For nearly a century in cities across the United States, these patterns of investment and disinvestment and concentrations of poverty have also been closely tied to patterns of residential segregation. In other words, urban heat islands are not just a public health concern but “a question of environmental justice” as well (Wilson, 2020).

In many cities, redlining maps produced in the midst of the New Deal by the Home Owners Loan Corporation (HOLC) to guide federal homeownership programs – and that guided private lenders’ decisions, too – set the stage for which areas would see investment and disinvestment over the decades to follow. Areas were shaded red (deemed “hazardous” for investment) in these 1930s maps if they had older and denser housing, or if they were home to Black or Hispanic residents. Today, there is a strong association between neighborhoods’ ratings on these maps and current amount of tree cover in dozens of cities. One study found that redlined areas (or Grade D neighborhoods) now have 21% less tree canopy coverage and are 2.6 degrees Celsius warmer than Grade A neighborhoods (Nardone, Rudolph, Morello-Frosch, & Casey, 2021).

While no record of an HOLC redlining map exists for Allentown, the city has seen similar patterns of investing in newer, more suburban-style areas and disinvesting in older, denser ones. Property values are lower, on average, in the urban core than outside of it. Financing for home purchases or improvements is also harder to come by. For instance, over one-fourth of all home loans were denied throughout most of these center-city neighborhoods, and for a large swath of the downtown area, denial rates were above 35% (see Map 4).

Map 4: % of Home Loans Denied (2019) by Census Tract



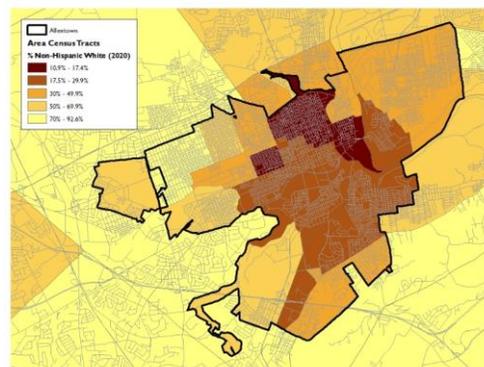
Source: PolicyMap, author.

The region also has a high level of residential segregation. According to an analysis of 2020 Census data, the Lehigh Valley ranks 27th (out of over 400 metropolitan areas) in terms of Hispanic-White segregation. The most commonly used measure of residential segregation, the “dissimilarity index”, which measures how evenly two groups are distributed throughout a region, fully half (50.5%) of all Hispanic residents in the Allentown-Bethlehem-Easton MSA would have to move to a different neighborhood in order for every neighborhood to have the same racial and ethnic breakdown as the MSA as a whole (Logan, 2021).

While individuals and households choose where to live based on personal preferences and what they can afford, these choices can be heavily influenced by structural and institutional forces. Those larger forces have actively maintained this level of segregation in the Lehigh Valley, a level that has remained fairly steady over the last 30 years (Frey, 2011). Less than ten years ago, a housing sting conducted in the area found that real estate agents consistently treated white and minority home buyers differently. White and non-white actors, posing as potential homebuyers, visited real estate offices. When they compared their experiences afterwards, they found that agents consistently steered “white buyers to the suburbs and minorities to the city,” even the testers were given the same job history and income to present (Lash, 2012).

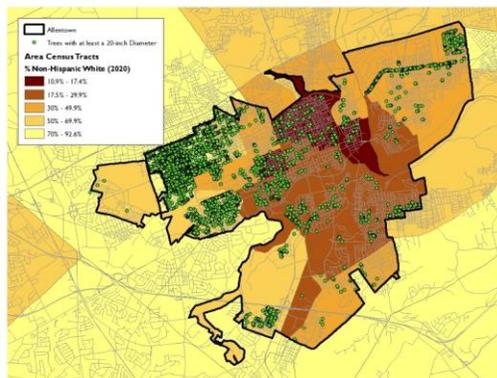
Taken together, this means that the benefits of investment and the harm of disinvestment flow to two different groups of people. As just one example, in Allentown (as is true elsewhere), non-Hispanic White residents are far more likely to live in neighborhoods with more environmental amenities, like greenspace and trees (see Map 5 and Map 6).

Map 5: % of Non-Hispanic White Residents by Census Tract (2020)



Source: 2019 American Community Survey 5-Year Estimates, author.

Map 6: % Non-Hispanic White Residents by Census Tract (2020) with Mature Trees



Source: 2019 American Community Survey 5-Year Estimates, City of Allentown, author.

In contrast, Hispanic and Black residents (again, in Allentown and elsewhere) are more likely to face “increased exposure to environmental hazards,” including areas with fewer trees, poorer air quality, more diesel particulate exhaust, and hotter temperatures (Nardone et al., 2021; Hoffman, Shandas, & Pendleton, 2020). This “thermal inequality” is only compounded by the fact that racial minorities and lower-income households, who suffer disproportionately from urban heat islands, also tend to have “lower capacity to prepare for and cope with extreme weather” and even less likely to have access to adaptations like air conditioning (Wilson, 2020; Saverino et al., 2021).

Given the severe consequences of urban heat islands that exist today, and recognizing that these consequences will only worsen over the next several decades as global temperatures rise, what can policymakers, local officials and stakeholders do (Wilson, 2020)? The easiest answer is more greenspace and trees, proven methods for mitigating heat, filtering air pollutants, and improving residents’ physical and mental wellbeing (Wilson, 2020; Hoffman et al., 2020; Nardone et al., 2021).

While any tree coverage is helpful to a certain degree, substantial tree coverage – coverage of at least 40% – is necessary to have the greatest cooling effect (Saverino et al., 2021).

This type of strategy is by no means new. Urban greening has been a popular approach from the mid-19th Century onward, and “urban forestry” and street-tree planting have been key parts of these greening efforts, alongside the creation of larger parks, from the beginning (Eisenman, 2015; Grove et al., 2018). What makes things different today is the power we now know trees have to address what have come to be serious environmental injustices. “Tree equity” has the promise to reduce urban heat island effects, lessen environmental hazards in neighborhoods with lower air quality, and, as a result, shrink racial and economic health gaps (Tree equity score, 2021).

Several cities are experimenting with ways to improve their “tree equity” and could serve as models for the Lehigh Valley. Syracuse (NY), for example, recently implemented a “municipal sidewalk program” in June 2021. For an annual fee charged to property owners, city officials and staff now oversee the maintenance and upkeep of city sidewalks, which can include care for street trees (Baker, 2021). In another example, Philadelphia (PA) is using “neighborhood ambassadors” to engage residents in conversations about the need for additional greening and trees in neighborhoods across the city, and also to evaluate existing policies and programs that support neighborhood greening (Jackson, 2021). In Louisville (KY), the Green Heart Project (supported by the National Institutes of Health and the Nature Conservancy) is planting “fully grown trees, as tall as 30 feet, in a test area within the city” and quantifying the impact of the new canopy on resident health and well-being (Anderson, Eckert, & McMinn, 2019). Our local urban heat islands, particularly the one in downtown Allentown, demand this kind of approach.

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The Future of Environmental Justice

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The Future of Environmental Justice

The most basic level of environmental justice is making sure that poor or minority communities, often called ‘EJ communities’, do not suffer disproportionate impacts and have an informed and effective voice in the decisions that affect them. After many decades, though, this basic principle of environmental equity is still a goal that is often unrealized. It is essential to eliminate these unfair impacts, repair the damage, and make the victims whole — but even that would still fall far short of living up to the term environmental justice.

Environmental justice has to mean more than just spreading the harm more equally — it has to mean actually preventing harm, making sure people are not being harmed by their environment in the places where they live, work, and play — now and in the future. This is not intended as an ‘academic’ or theoretical analysis, but as a discussion of ideas that we need to consider if we are to achieve full EJ. Before we examine the situation here in the Lehigh Valley, let’s take a quick look at what has happened to date.

Events That Moved the United States Towards Environmental Justice

We identified some historical events that led to advances in our understanding of Environmental Justice.

- In the 1960s, following the Civil Rights movement, people became increasingly aware that pollution, disruptive infrastructure projects, and environmental hazards were often intentionally located in or near communities that were mostly Black and/or poor.

- In 1968, the National Environmental Policy Act [NEPA] mandated greater transparency and included a ‘polluter pays’ approach, but actual achievements often fall short of those goals (Council on Environmental Quality, 2021).

- In the 1970s and 1980s, the EJ movement continued to grow, raising awareness of disproportionate burdens to minority and poor communities and the failure to include them in the decision-making processes.

- In 1990, the Southwest Organizing Project (SWOP) called a regional conference on EJ that included Indigenous people who brought a different way of thinking about people’s relation to the environment and to each other. SWOP called out ten major national environmental organizations for failing to work with activists of color, for accepting massive support from major polluters, and for failing to have people of color on their staffs and boards of directors. One important result of the SWOP conference was the formation of the Indigenous Environmental Network (IEN), which remains active today (Indigenous Environmental Network, 2021).

- A major step forward came in 1991, with the People of Color Environmental Justice Summit. Hundreds of delegates assembled in Washington DC and developed a comprehensive declaration of ‘The 17 Principles of Environmental Justice’ that broadened the definition of environmental justice to include all people and the places where they live, work, and play.

- In 1994, President Clinton signed Executive Order 12898 directing all federal agencies to develop environmental justice plans. This gave a boost to the environmental justice movement but seemed to result in more talk than real change. It focused on environmental racism and equity, not the broader, more universal principles from the Summit.

- In 2014, Texas Southern University's School of Public Affairs published a report on the state of environmental justice 20 years later (Texas Southern University, 2014). It included many reports from people who praised the executive order — but others provided indications that all was not well:

“Even now 20 years after the signing of the Environmental Justice Executive Order, communities in Louisiana’s Cancer Alley are still fighting for justice and a safe future for their communities.”

—*Darryl Malek-Wiley, Sierra Club Environmental Justice & Community Partnership Program, New Orleans, LA*

“The only ones celebrating the 20th anniversary of the Executive Order is the federal government for succeeding to put on the biggest fraud and sin against EJ communities everywhere.”

—*Suzie Canales, Executive Director, Citizens for Environmental Justice, Corpus Christi TX*

- Later that year, the Flint water crisis proved the critics’ point. The Flint Water Advisory Task Force described the Flint water crisis as “a story of government failure, intransigence, unpreparedness, delay, inaction, and environmental injustice” (Compbell, 2016). The same report quotes Dr. Robert Bullard, dean of the School of Public Health at Texas Southern University, as saying the Flint water crisis was a classic case of environmental racism, where “... regional EPA officials and state officials in Michigan responded first with a cover-up, and then defensively—either trying to avoid responsibility or minimizing the extent of the damage.”

Why Has There been So Little Progress?

Despite all the nice words from federal and state agencies, it seems clear that racism and other factors continue to block even the most basic level of environmental justice. These failures also violate the Civil Rights Act, since it bans discrimination based on race, color, religion, sex, national origin (and later, sexual orientation and gender identity). Even achieving those oft-repeated goals would not achieve the broader principles outlined at the 1991 Summit, which included preventing harm before it occurs, shifting the burden to polluters, and redressing existing inequities.

Let’s Move Towards Real Environmental Justice

To achieve real environmental justice, we need to actually prevent harm. We need to protect human health and the environment. As early as 1970, European governments had developed what they called a precautionary approach, but this was largely ignored in the U.S. (Brands, 2009). It was not until 1998 that the Science & Environmental Health Network convened a group that developed a clear definition of the Precautionary Principle:

“When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the Precautionary Principle must be open, informed, and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.”

Even today, though, regulations still fail to prevent widespread exposure to pollutants that are not only toxic, but are carcinogens and endocrine disruptors. Instead of protecting people and the environment from harm, regulatory agencies like the EPA actually determine what level of harm they will permit (at least until the damage is proven beyond any reasonable doubt). They do not follow the Precautionary Principle, so we continue to encounter these life- and health-threatening pollutants in the air we breathe, the food we eat, and the water we drink — and in many products that we buy.

“In 2005 a small study of the umbilical cord blood from 10 randomly chosen newborns in the U.S. showed that babies are now coming into this world “pre-polluted” with 200 industrial compounds.”

While this study was limited due to the high cost of testing for multiple pollutants in blood samples, we do know that the chemicals listed in the report have great potential to harm human health (Environmental Working Group, 2005). We’ve known for decades that many common pollutants, such as industrial chemicals and pesticides can persist for decades and cause intergenerational effects. However, the EPA, successive administrations, and Congress all seem to be more interested in producing impressive rhetoric and protecting the polluters (and their profits) instead of protecting the environment and the people. (The same can be said for most state governments and agencies.) One clear example is the exemption of all fracking processes from clean water and other standards. As E.G. Vallianatos and McKay Jenkins demonstrated in *Poison Spring: The Secret History of Pollution and the EPA*, the EPA has a long history of protecting polluters. In 2015, in a review of *Poison Spring* Carol Van Strum writes:

“Ever since its creation in 1970 the US-EPA has been a failing organization, serving the corporations it was there to regulate, falsifying data, suppressing the truth about pesticide toxicity, and crushing whistleblowers.”

In 2015, an article was published by the European Union Times saying that the EPA has banned a type of pesticide that is dangerous to birds and bees and can even kill them. While talking about the ban on these products Jonathan Evans, a senior attorney at the Center for Biological Diversity, says:

“EPA has recognized these products are dangerous and they are not going to allow new ones, [but] it “will do nothing about the existing harm that is occurring to...pollinators from already registered products.”

In July of 2019, the EPA said that they would not put a ban on pesticide chlorpyrifos. Chlorpyrifos is used to control pests and foliage on many different types of fruits and crops. When the EPA made this decision, Erik Olson, senior director for health and food at the Natural Resources Defense Council, said: “Scientists have repeatedly made it clear that chlorpyrifos is linked to long-term harm to kids’ brains.... Until EPA gets this stuff out of our fields and off our food, this fight is not over.”

To achieve environmental justice, we think it is essential to protect all people, including youth and children — and future generations. The idea of considering the welfare of children and future generations is not new — in fact, it was stated about 1,000 years ago in the Haudenosaunee people’s ‘Great Law of Peace’, founding what is often referred to as the Iroquois Confederacy. Benjamin Franklin was impressed by their governance, and even brought some of their concepts into the U.S. Constitution (Yancy, 2021). (Unfortunately, he did not include the need to consider future generations, or for that matter, the central role women played in Haudenosaunee society and governance).

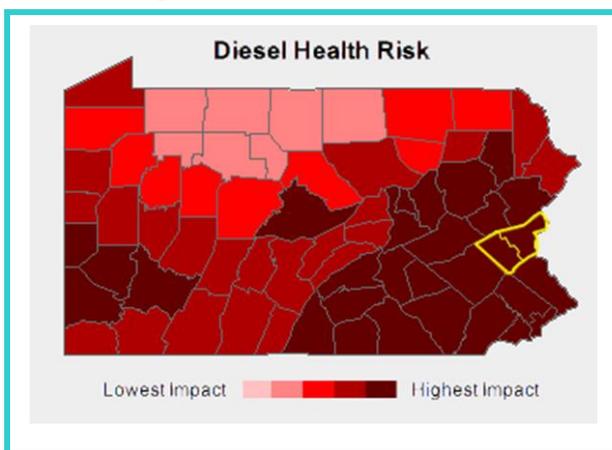
In general, planning and politics today rely primarily on economic considerations and short-term thinking that discounts or ignores the importance of impacts on future generations.

The challenge is to make government, politicians, and planners incorporate comprehensive, longer-term thinking — to remember that two of the key principles of ecology are that everything is connected to everything else and that there’s no such thing as a free lunch. Leaving a polluted planet for others to deal with is not environmental justice. Today’s youth and future generations deserve a safe and healthy environment and climate, and their voices need to be considered in EJ concerns. As Greta Thunberg said at the New York City Climate Strike in September 2019: “We deserve a safe future. And we demand a safe future. Is that really too much to ask?”

Environmental Justice in Pennsylvania and the Lehigh Valley

The state Department of Environmental Protection [DEP) says its mission is “to protect Pennsylvania’s air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment... work as partners with individuals, organizations, governments, and businesses to prevent pollution and restore our natural resources.” We could point to many cases where they have failed to do so, and it would be more accurate to say they, just like the EPA, are in the business of deciding how much harm to permit. In 1997, the DEP took a first step towards EJ, when they denied a permit for yet another polluting facility in the already-burdened, majority-POC city of Chester. DEP went on to set up an environmental justice working group and, finally, an office of environmental justice.

In the Lehigh Valley, many people thought the closing of Bethlehem Steel put an end to air pollution here — but we still have some of the worst air quality in the nation, according to the Asthma and Allergy Foundation. While the exact rank varies from year to year, their 2021 report puts the Allentown metropolitan area as #1 — the worst air quality in the nation (AAFA). The extent of the problem here is depicted in this 2012 map from Clean Air Task Force:



A new report released in October 2021 by PennEnvironment confirms the problem (Environment America Research & Policy Center). The real culprits here in the Lehigh Valley are vehicle emissions and the cement kilns, complicated by the fact that the Valley is an ‘air basin’ that tends to retain air pollution. Based on national statistics, this causes or is a major factor in about 300 deaths per year in the Lehigh Valley.

While the harm from air pollution is Valley-wide, local conditions add to the burden in areas where people are exposed to higher-than-average traffic from nearby roads and high-traffic facilities. Warehouse distribution centers are an obvious example, but parking structures and large commercial buildings can be equally problematic — yet several such facilities have been approved just this year in problematic locations.

In addition to creating environmental injustices, these decisions fly in the face of Article 1 §27 of the Pennsylvania Constitution, which says:

“The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.”

In 2012, the Pennsylvania Supreme Court issued a breakthrough ruling that agencies must live up to this requirement. When state and municipal officials fail to follow the Precautionary Principle, they are allowing harm — and violating the PA Constitution that they swore to uphold.

Global warming and climate change have made it obvious that environmental injustice affects everyone, even those who did not contribute to the problems. Throughout the world, the unfolding climate catastrophe is already a leading threat to public health. It will have huge impacts on the Global South and on young people and future generations everywhere, but they have no voice in the actual decisions the two most basic principles of environmental justice.

Major highways span the Lehigh Valley, and there are numerous distribution-centers ‘warehouses’ here, so it is not surprising that the Valley is a significant generator of the greenhouse gasses (GHG) that fuel global warming and the climate emergency. Use of fossil fuels for heating, generating electricity, motor vehicles, and industry all contribute to the problem. Two major contributors are widespread use of natural gas (with total climate impacts roughly equivalent to coal) and consumption of plastic (which releases GHG when manufactured, in use, and when it is disposed of). The Bethlehem Climate Action Plan addresses ways to both mitigate and adapt to climate change and has a strong focus on environmental justice and environmental equity. It also calls for integrating global warming and the climate emergency throughout the educational system.

Why Aren’t All Lehigh Valley Schools Teaching About Environmental Justice and Climate Justice?

It is startling to realize that — over 20 years after the impacts of global warming and climate change were widely known, and over seven years since the Bethlehem Area School District adopted a Climate and Sustainability Commitment (Alliance for Sustainable Communities) — that climate change is not integrated throughout the curriculum at all age levels. Although there have been some improvements in teaching the science, many students still graduate without having learned about the climate emergency or climate justice in school. At the 2019 Climate Strike rally in Bethlehem, local student Dhara Burak, then 14, said:

“...every time I think about the realistic future, all I see is the world ending. It’s the fact that I don’t get to dream because of greenhouse gasses and big oil companies.... All climate scientists agree: climate change is real, and the consequences are about to hit us hard...”

We Have a Long Way to Go

Past and current harms must be redressed, of course, but we also must move towards a realistic concept of EJ that focuses on preventing harm to all people rather than spreading it more equally; we must apply the Precautionary Principle (see above), protect youth and children, and give full weight to impacts on future generations. The mechanics of how to do this will vary according to the situation, but the key is to place people first in business and legal decisions.

This common-sense, harm-prevention approach is so obvious that we have to question why it was not done decades ago, as soon as we understood the widespread harm to people’s health from synthetic chemicals and fossil-fuel pollution.

Our understanding of environmental justice continues to grow. Australian scholar Christine Winter raises questions about what environmental justice means — when we are talking about the rights of nature. What is environmental justice for a river? ...for a mountain? ...for an entire ecosystem? We have not yet had time to digest her recently-published book (Winter, 2021), but these explorations could dramatically expand our thinking about environmental justice in the future.

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Climate Justice in the Lehigh Valley

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Global Warming

The Past and Present

The planet has been warming at an unprecedented rate. This increase is driven by the anthropogenic production of heat-trapping greenhouse gasses, primarily carbon dioxide, methane, and nitrous oxide (Eyring et al., 2021). In 2019, the atmospheric concentration of carbon dioxide was the highest it had been in 2 million years, and the concentrations of methane and nitrous oxide was the highest it had been in 800,000 years; since 1750, methane concentration increased the most at 156%. Carbon dioxide was next at 53% followed by nitrous oxide at 23% (Eyring et al., 2021). Human activities that have led to the increase in greenhouse gas (GHG) concentration include the burning of fossil fuels, large-scale industrial farming, and deforestation, to name just a few causes (Cardinale et al., 2019; Eyring et al., 2021).

So how much has the planet warmed? Between 1850 and 2019, global surface temperature increased by 1.07 °C. And the planet is warming at an increasing rate. Over the last four decades, each decade was warmer than the one before it and the 50-year period starting in 1970 saw the greatest increase in surface temperature over at least the last 200 years (Eyring et al. 2021). Last year was the 6th warmest year on record since 1880 and was 0.84 °C (1.51°F) above the 20th-century average (National Oceanographic and Atmospheric Administration, 2022a).

The years 2019 and 2020 were among the top three warmest years (National Oceanographic and Atmospheric Administration, 2022a) and December 2021 was the warmest December on record for the contiguous United States (U.S.) with an average of 39.3°F, which is 6.7°F above average (National Oceanographic and Atmospheric Administration, 2022b). July 2021 was 1.54 °C (2.77 °F above average) and was the hottest month ever (National Oceanographic and Atmospheric Administration, 2021). The year 2021 was the 45th consecutive year that had above average global temperatures, with the years 2013-2021 ranking among the ten warmest years on record (National Oceanographic and Atmospheric Administration, 2022a).

The Future

When projecting global warming into the future, the Intergovernmental Panel on Climate Change (IPCC) uses five different scenarios that can be grouped into worst-case, intermediate, and best-case scenarios (Eyring et al. 2021). In the worst-case scenarios (SSP3-7.0 and SSP5-8.5), GHG emissions are about double what they are today. In the intermediate scenario, GHG emissions stay roughly the same as current levels until about mid-century and then decline (SSP2-4.5).

And in the best-case scenarios (SSP1-1.9 and SSP1-2.6), it is assumed that GHG emissions will be net-zero around or after 2050, with varying levels of net-negative emission (Eyring et al., 2021). How much the planet will warm, of course, will depend on which scenario we follow, but all scenarios point to a significant increase in global temperature (Table 1).

The National Oceanographic and Atmospheric Administration (NOAA) tracks "billion-dollar weather and climate events" in the U.S. - where overall damages/costs due to the event reaches or exceeded \$1 billion dollars. In 2021, the U.S. experienced 20 such events that killed at least 688 people and cost a total of \$145 billion.

Table 1

Projected increase in global temperature (°C) based on Intergovernmental Panel on Climate Change (IPCC) emission scenarios. Scenarios are listed from best-case at the top to worst-case at the bottom. Reproduced from Eyring et al. (2021).

Scenario	Near term (2021-2040)		Mid-term (2041-2060)		Long term (2081-2100)	
	<i>Best estimate</i>	<i>Very likely range</i>	<i>Best estimate</i>	<i>Very likely range</i>	<i>Best estimate</i>	<i>Very likely range</i>
SSP1-1.9	1.5	1.2 - 1.7	1.6	1.2 - 2.0	1.4	1.0 - 1.8
SSP1-2.6	1.5	1.2 - 1.8	1.7	1.3 - 2.2	1.8	1.3 - 1.4
SSP2-4.5	1.5	1.2 - 1.8	2.0	1.6 - 2.5	2.7	2.1 - 3.5
SSP3-7.0	1.5	1.2 - 1.8	2.1	1.7 - 2.6	3.6	2.8 - 4.6
SSP5-8.5	1.6	1.3 - 1.9	2.4	1.9 - 3.0	4.4	3.3 - 5.7

Global Climate Change

The Past and Present

The effect of increased warming is a major disruption of climate on a global scale. This has already led to stronger and more frequent storms, increased frequency and intensity of heat waves, heavier rainfall, sea level rise, increased flooding due to increased rainfall and sea level rise, ocean warming and acidification, increased intensity of hurricanes, and droughts (Cardinale et al. 2019; Eyring et al. 2021).

Events included 1 winter storm/cold wave event across the deep south and Texas, 1 wildfire event across Arizona, California, Colorado, Idaho, Montana, Oregon, and Washington. One drought and heat wave event across western U.S. during the summer/fall, 2 flood events in California and Louisiana, 3 tornado outbreaks, 4 tropical cyclones, and 8 severe weather events across many parts of the country. This was the second highest total number of events, just behind 2020, which had 22 events.

However, the number of deaths in 2021 was more than twice that in 2020 (262) and was over \$40 billion more costly than 2020 (\$102 billion). The total cost of billion-dollar disasters from 2017-2021 was over \$742 billion and averaged \$148 billion per year. Both are record highs. Overall, the U.S. experienced 310 such events from 1980 to 2021 with a total cost of over \$2.155 trillion in total (National Centers for Environmental Information, 2022).

The Future

Conditions will worsen as the planet continues to warm. Every 0.5 °C increase in global temperature leads to a larger change in climate (Eyring et al., 2021); the average global temperatures have increased approximately 0.18 °C (0.32°F) per decade. An example of this is the mid-February winter storm/cold wave that hit the U.S. in 2021, which was the costliest winter storm on record (\$24 billion). This is more than double the previous record winter storm event, the "Storm of the Century" in March 1993 (National Centers for Environmental Information, 2022). What is even more frightening is that many of the changes that have already occurred to the climate will take centuries to millennia to reverse, even if we reached net-zero emissions today (Eyring et al., 2021). According to the United Nations Environment Programme (UNEP), we are on track for an increase in global temperature of 2.7°C by 2100. This almost doubles the goal set in the Paris climate agreement to keep the increase in global temperature to less than 1.5°C, above which is expected to lead to catastrophic disruptions of the global climate. To meet the 1.5°C goal, annual global greenhouse gas emissions would need to be cut in half over the next *eight* years (United Nations Environment Programme, 2021).

Global Warming, Climate Change, and Vulnerability in the Lehigh Valley

A Historical View

According to NOAA, from 1980 to 2021, Pennsylvania experienced 82 billion-dollar weather and climate events. These included 14 tropical cyclones, 41 severe storm, 16 winter storms, 7 droughts, 3 floods, and 1 freeze, which are occurring with increasing frequency (National Oceanographic and Atmospheric Administration, 2022C).

Vulnerability to climate change has two dimensions: the physical dimension, which is focused on the exposure of people and places to climatic events, and the social dimension, which describes susceptibility to the adverse effects of climate change based on social, economic, and political factors (Swanson, 2021). NOAA conducted a historical risk assessment at the county level, consisting of hazard risk (physical dimension) and social vulnerability scores (social dimension). Compared to the U.S. as a whole (Table 2), Pennsylvania has a lower historical hazard risk score, but both Lehigh and Northampton Counties had higher hazard risk scores than Pennsylvania as a whole (Lehigh's value is higher than the U.S.). Pennsylvania also had a lower social vulnerability score than the U.S., but Lehigh County had a higher score than both the state and the country (National Centers for Environmental Information, 2022).

The Future

How will the Lehigh Valley be affected by climate change in the future? NOAA estimated the future impacts of climate change for each county based on the IPCC's worst-case scenario (National Oceanographic and Atmospheric Administration, 2022).

Table 2

Historical Risk Assessment Comparing Pennsylvania, the Lehigh Valley and the United States (National Centers for Environmental Information, 2022).

	U.S.	Pennsylvania	Lehigh County	Northampton County
Hazard Risk	14.67	10.61	19.59	40.01
Social Vulnerability	38.35	35.65	14.42	32.72

The analysis included percent change in crop yields (corn, wheat, soybeans, and cotton), electricity demand, labor supply of full-time-equivalent workers for high-risk jobs (i.e., workers who are significantly exposed to outdoor temperatures), damages from coastal storms, median total direct economic damage across all sectors (% of county GDP), and change (deaths / 100,000) in all-cause mortality rates (across all age groups). It does not look good for the Valley or the state (Table 3). Both are expected to show significant declines in crop yields and high-risk labor change, increases in energy expenditure, and damage to their GDP. The loss in crop yields is greater than the U.S. for both the state and Valley. The only bright spot is a decline in mortality.

In 2018, the Lehigh Valley Planning Commission (Lehigh Valley Planning Commission, 2018) published its latest Hazard Mitigation Plan in which it assessed the risk to the Valley from natural and non-natural hazards (Lehigh Valley Planning Commission, 2018). It found that, compared to its 2013 report, the risk of drought increased from moderate to high: The Lehigh Valley experienced 43 drought events between 1950 and 2017, which averaged about 0.64 events/year; this is more than doubled the number of events per year from 1895 to 1942: 14 drought events or about 0.30 events/year.

Table 3

Assessment of Future Risks Comparing Pennsylvania, the Lehigh Valley and the United States (National Oceanographic and Atmospheric Administration, 2022C)

Risk	Lehigh County	Nothampton County	Pennsylvania	U.S.
Agricultural Damage (% Change)	-16.94	-19.93	-20.08	-11.91
Mortality (Change in Deaths/100k)	-4.70	-4.59	-7.59	9.16
Energy Expenditures (% Change)	6.97	6.97	6.32	9.24
High-Risk Labor (% Change)	-1.17	-1.17	-1.09	-1.51
Coastal Storm Damage (% County GDP)	0.01	0.01	0.01	0.29
Total Damage (% County GDP)	0.42	0.61	-0.21	4.57

The risk of extreme temperature, defined as temperatures that are 10°F or more above the average high temperature for a region during the summer months, increased from moderate to high and was responsible for more deaths in Pennsylvania than all other natural disasters combined. The most significant natural hazard for the Lehigh Valley is floods. About 5% of the Lehigh Valley (greater than 37 square miles) is at risk of a 100-year flood (1% annual chance floodplain).

This equates to approximately 12,000 people being directly exposed to the risk of a 100-year flood. Even more people will be indirectly affected. In the Lehigh County alone, it is estimated that 17,816 people (5.1% of the population) could be displaced and 3,930 people (1.1% of the population) might need to seek short-term sheltering due to flooding.

In Northampton County, it is estimated that 14,305 people (4.8% of population) will be displaced and 2,869 (1.0%) people will need to seek short-term sheltering. However, an analysis reported in the Morning Call (Ocasio, 2020) suggests that the flood risk projections reported in the Hazard Mitigation Plan (Lehigh Valley Planning Commission, 2018) are underestimates because they rely on Federal Emergency Management Agency (FEMA) flood insurance maps, which do not take into account future impacts on climate change. An analysis by the nonprofit First Street Foundation, which takes into account the future effects of climate change, found that 5,486 Allentown residents are vulnerable to a 100-year flood while the Hazard Mitigation Plan estimated 1,034 residents are at risk. The underestimates for Bethlehem and Easton are even greater: 4,725 vs. 366 and 2,300 vs. 282 residents, respectively (Ocasio, 2022).

Climate Justice

What is meant by climate justice? According to Simmons (2020), climate justice "is a term, and more than that a movement, that acknowledges climate change can have differing social, economic, public health, and other adverse impacts on underprivileged populations." In other words, the effects of climate change will not be felt equally among people and communities.

Those that will be most affected include low-income communities, indigenous people, people of color, people with disabilities, elderly or very young people, and women. It is also clear that people who are most affected by climate change generally contribute the least to the causes of climate change and have the fewest resources to cope with it (Chapman and Ahmed, 2021).

More recently, many have begun to argue that there is a strong connection between racism and climate change. In an article published in the Washington Post, Sarah Kaplan (2020) summarized some of these connections. One example of this connection is that coastal communities in the southern U.S. that are made up of a majority of African Americans will be most affected by sea-level rise; the racial make-up of these communities can be traced back to slavery - plantation owners in this region explicitly sought West African people because of their knowledge and skill in farming in tidal environments (Hardy et al. 2017). Another example is that neighborhoods formed through "redlining" have more pavement, fewer trees, and higher average temperatures. As mentioned above, people who are most vulnerable to the effects climate change often do not have the resources to deal with it.

For example, more than 30% of Black New Orleans residents did not own cars when Hurricane Katrina hit, which made it nearly impossible to evacuate before the storm. After the storm, fewer Black residents could afford to return to the city, causing the Black population to decline (Kaplan, 2020).

However, this definition is incomplete. Climate justice must also acknowledge that the policies and practices to mitigate and adapt to climate change will benefit some people more than others and will negatively affect some people more than others.

Swanson (2021) refers to this as climate adaptation injustice (i.e., injustice from climate policy), which can take two forms: acts of commission or acts of omission. Acts of commission include interventions (e.g., infrastructure investments) that disproportionately affect or displace poor and marginalized residents. Acts of omission occur when the protection of privileged communities or assets are prioritized over the protection of poorer or marginalized ones (Swanson, 2021). Hardy et al. (2017) refers to mitigation and adaptation planning projects that overlook or dismiss racial inequality and its systemic causes by attributing racial inequality to non-racial causes. Thus, a more complete discussion of climate justice should include the following five key assumptions (Barnett, 2006, as reported in Swanson, 2021): "(1) the responsibility for climate change is not equally distributed; (2) climate change will not affect all people equally with some people and groups more vulnerable; (3) this vulnerability is determined by political-economic processes that benefit some people more than others; (4) climate change will compound underdevelopment; and (5) climate change policies may themselves create unfair outcomes by exacerbating, maintaining, or ignoring inequities."

It follows, then, that as climate action plans are developed (or revised), they must include social equity considerations to ensure that both the planning process and the plans themselves are inclusive, equitable, and just. This means that climate action planning must be framed in the context of distributive, procedural, and recognition justices. Distributive justice is concerned with the distribution of benefits and burdens among stakeholders, procedural justice relates to fair, transparent, and inclusive decision-making, and recognition justice is concerned with policy framing and analysis and how particular populations are made visible or invisible during the development of policy (Swanson, 2021).

The State of Climate (In)Justice in the Lehigh Valley

It is beyond the scope of this article to do a fine-grain analysis of the state of climate justice in the Lehigh Valley. This would entail doing a detailed analysis of how well climate change plans address equity, inclusion and justice related to climate change mitigation and adaptation not only for the Valley as a whole but also for all of the municipalities in the Valley. Therefore, my approach is to look at the potential for climate injustice in the Lehigh Valley. We know which groups are most likely to face climate injustice, so a demographic analysis of the population of the Lehigh Valley will give us an indication of the potential for climate injustice, which would occur if these populations and communities are not fully engaged in the planning of climate action plans and if these plans do not explicitly address the vulnerabilities of these communities and populations.

Since 1970, the population size of the groups that are more likely to suffer from climate injustice has been increasing, and it is reasonable to assume that this trend will continue (Table 4). Unfortunately, but not unexpectedly, there is evidence that these populations are already disproportionately affected by climate change. An analysis done by Ocasio (2022) found that the areas most susceptible to flooding are majority-minority communities, such as Center City Allentown, West Easton, and Fountain Hill.

As discussed above, groups that are most affected by climate change are less likely to have the resources to cope with the effects of a disrupted climate. One way to get a sense of this for populations in the Lehigh Valley is to assess social and racial inequity in the level of access to opportunity for housing, education, transportation, and employment.

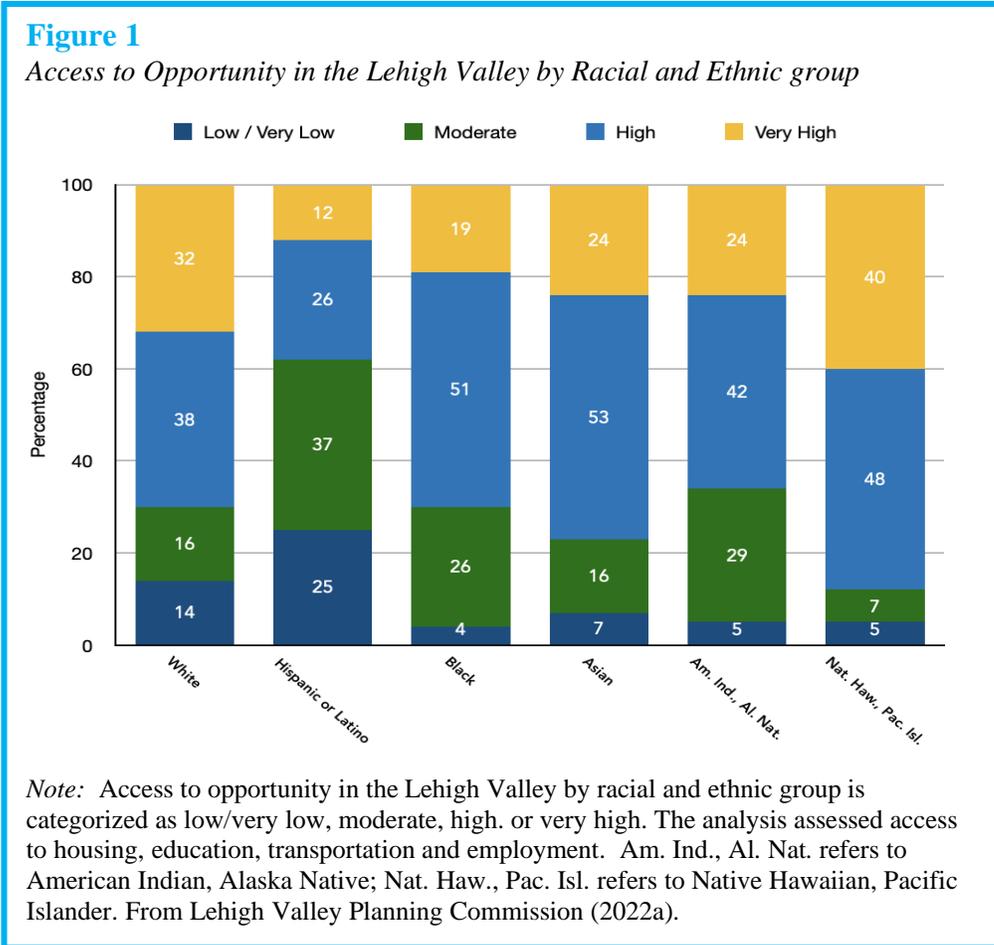
The Lehigh Valley Planning Commission (LVPC) conducted an equity analysis of access to opportunity by race and ethnicity and categorized access as either very low, low, moderate, high, or very high. As expected, access varied widely across groups (Figure 1). It should be noted that 25% of individuals that identified as Hispanic or Latino live in areas with very low or low access to opportunities. Further analysis by LVPC found that, while Hispanics or Latinos make up nearly 21% of the population in the Lehigh Valley (Table 4), only about 38% of Hispanics or Latinos have high or very high access to opportunity compared to 79% of Non-Hispanics or Latinos (Lehigh Valley Planning Commission, 2022a).

Other groups that are disproportionately affected by climate change include the elderly, urban communities, and people living in poverty. About 16% of the population in the Lehigh Valley is 65 years old or older, with a trend towards the overall population getting older.

Table 4

Population size as percentage of the total population of the Lehigh Valley by race and ethnicity by year (Lehigh Valley Planning Commission, 2022a).

Year	Black	American Indian, Alaska Native	Asian	Other	Hispanic or Latino	Not Hispanic or Latino	White
1970	1.2	0.0	0.1	0.1	1.5	98.5	98.6
1980	1.6	0.1	0.5	1.3	2.8	97.2	96.5
1990	2.2	0.1	1.2	2.8	4.9	95.1	93.7
2000	3.2	0.2	1.8	5.9	8.6	91.4	89.0
2010	5.6	0.3	2.7	9.0	14.9	85.1	82.4
2020	6.8	0.3	3.5	19.1	20.9	79.4	70.3



Additionally, 45.8% live in urban areas and twenty-six percent of Hispanics or Latinos live below the poverty line, compared to 18% non-White and 7% White people living below the poverty line (Lehigh Valley Planning Commission, 2018; Lehigh Valley Planning Commission, 2022a). Clearly, it is important that the voices and needs of these populations and communities are heard and integrated fully in all climate action plans. The LVPC’s Hazard Mitigation Plan (LVPC, 2018) does not assess vulnerability to climate change by socioeconomic, racial, or ethnic groups nor does it explicitly address justice issues. Neither does the LVPC Climate Action Plan (Lehigh Valley Planning Commission, 2022b), which addresses climate change mitigation and adaptation through ... "smart growth, economic savings, natural resource protection, green infrastructure and sustainability." Climate justice is not included in its goals or actions.

It needs to be noted, however, that the City of Bethlehem’s Climate Action Plan (City of Bethlehem, 2021) explicitly addresses climate justice and integrates it into the planning and implementation goals of the plan, including : "To achieve Bethlehem’s vision of just and equitable climate action, the city commits to: Establishing a just and ethical long-term framework for climate action supporting equity for all Bethlehem residents [and] Ensuring 40% of overall benefits resulting from city spending on implementing this CAP goes to frontline communities." Frontline communities include Black, Indigenous, and People of Color (BIPOC), low-income residents, and people with existing health conditions.

Conclusion

Global warming and climate change is happening and will have significant and long-lasting effects in the Lehigh Valley. However, not all people or communities will be affected the same. Some communities will fare better, and many will fare worse. The same can be said for the strategies that will be implemented to mitigate and adapt to climate change. Climate justice must be explicitly addressed during the planning and implementation of climate action plans, as exemplified by the City of Bethlehem. It is not just a moral imperative. Making sure that we deal with climate change in a way that is inclusive, equitable, and just will make our plans and actions more effective in protecting people, communities, and nature from the devastating effects of global climate change.

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