Article

Potholes of Philadelphia: Seasonality, Infrastructure, and Environments Above and Below Ground

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Abstract

In cities with a continental climate, potholes are such an integral part of the transition from winter to spring that they have become their own season in the urban calendar: pothole season. In Philadelphia, "pothole season" became an annual regular feature with the expansion of the automobile age after World War II . Local newspapers used the phrase to mark the city's transition from winter to spring and also to mock governments' failure to mend roads or respond to dangerously sized craters on local streets and federal highways. For Philadelphians, the cyclical appearance of a thawing and freezing underground that made road surfaces break, eventually creating craters in roads that weredangerous to urban motorists and cyclists alike, became a way to understand how nature worked upon their city at a particular time of the year. Annually, pothole seasonality was a reminder that urban infrastructures failed when they ignored the dictates of nature that had environments above and below ground closely entangled. As a research perspective, finally, pothole seasonality helps to uncover slow but regular environmental changes and to extrapolate how urbanists and city governments cope, adapt, and transform in response to these reoccuring events.

Keywords

potholes, infrastructure, roads, seasonality, verticality, Philadelphia

"Potholes are beautiful," said Carol Sellers, twenty-five. "They have such lovely lines. Potholes are one of the most aesthetically pleasing products of our civilization."[1] In Spring 1978, Bob Green, staff writer at the *Philadelphia Inquirer*, opted for satire in his annual pothole cover story. He introduced the imaginary character of the young Carol Sellers, a "civic-minded young woman," whom he crafted after the new generation of environmental activists of the time.[2] Set on a "crusade to save an endangered species in America," the pothole, Green made Carol Sellers a founding member of an initiative called "Save Our Potholes" that took issue with "bigoted and prejudiced" press reporting that contended that potholes were "a blight on American life." Instead, so Green had Sellers say, whenever she saw a pothole, "I get a warm feeling. I want to reach out and put my arms around it and hold it."[3]

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In the City of Brotherly Love, potholes could make an early arrival in January and still appear as late as March or even April. This gave Philadelphians and local media ample opportunity to plunge into the topic, invariably including a satirical take. To mock potholes was not a means to critique or discredit the U.S. car culture, although in the late 1970s, there would have been ample issues to dig into. The energy crisis had brought many Americans to reject the gas-guzzling cars that Detroit produced. Increasingly American drivers turned to the more fuel-efficient imports of Japanese and European car producers initiating a protracted decline of U.S. auto manufacturing, including in Greater Philadelphia.[4] Rather, mocking the appearance of potholes during the transition from winter to spring had become a *seasonal* exercise that served as a narrative device to interpret broader urban-environment questions.

On the one hand, potholes offered ways to discuss how Philadelphia's city government appeared unable to cope with these environmental occurrences that cracked their streets open on a regular, seasonal basis. For the fictitious Sellers, the craters in road surfaces became the perfect symbol of what it was like to live in the United States in the 1970s—a time marked by conservative backlash, the institutionalization of environmentalism, and a massive energy crisis, in addition to the end of the Vietnam War and the Watergate scandal.[5] In Philadelphia, this also included the experience of massive deindustrialization, heightened racial tensions, and the political radicalism and police violence in connection with the activities of MOVE, a black liberation organization.[6] To commemorate what appeared as times of social tension, economic downfall, and political disarray, Sellers claimed, city crews should not fill the potholes. Instead, Philadelphia's city workers should put flags around them. "That way, drivers can steer around them, and at the same time treat themselves to a view of the many different and beautiful potholes that a city has to offer," said Sellers. "Instead of treating potholes like criminals, we should treat them as what they are—a valuable and lovely cultural resource."[7]

On the other hand, potholes were a way for Philadelphians to read climatic and temperature changes into the everyday appearance of their city, their roads, their avenues, and highways in a way that appeared to some even more accurate than nature itself. Potholes are no all-year-round or all-urban phenomena. They belong to the continental climate, where they represent a seasonally recurring appearance of a thawing and freezing ground marking the transition from winter to spring; a process that makes road surfaces break, eventually creating road craters dangerous to motorists and cyclists alike. In Philadelphia, "pothole season" was when urbanites would most strongly feel their city's built environment respond to the circadian rhythm of day and night temperature changes which, if below ten degrees Celsius/fifty degrees Fahrenheit, would lead to their road surfaces expand and contract. Pothole season was the time of year when urban infrastructure would notify city residents about the coming of spring.

Despite their size and frequency in the spring, potholes can easily go missing in urban environmental history, treated as a nuisance for drivers or a technical hazard to functioning infrastructure. In the massive literature on cars and automobility in the United States, road surfaces play less of a role, although technical historical accounts of paving gain traction.[8] History happens on roads, literature seems to suggest, not through them. Zooming in on urban mobility through potholes provides new perspectives. Situated on the asphalt surfaces, potholes allow scholars to understand cities *vertically* and in their interrelatedness between environments and infrastructures above and below ground. In this case, urban roads function as a semi-permeable membrane responding to the thawing and freezing ground. Potholes also open new ways of studying cities through changes that happen slowly, but regularly, as the craters occur with a distinct rhythm and logic across a span of months. Pothole *seasonality* hence provides the ultimate looking glass to uncover slow but regular environmental changes and challenges and to extrapolate how urbanists and city governments cope, adapt, and transform in response to these reoccurring events. Studying potholes and seasonality also means studying urban resilience in times of changing climates.[9]

The Urban Pothole Existence

To think with the fictitious Carol Sellers, potholes are a "migratory species," at least conceptually. Like some wild animals such as foxes, wild boars, or badgers, the term pothole migrated from its traditional rural habitat into those of urban metropoles during the first half of the twentieth century. In the United States, up until the 1940s, the term pothole (or more scientifically, prairie pothole) came up primarily in conversations among sportsmen going after migratory waterfowl. In the fall hunting season, these depressional wetlands—primarily freshwater marshes—would mark where to find birds.[10] Geologists, additionally, would use the term pothole for cylindrical holes in rock ledges that were caused by the wearing action of sand and pebbles whirled by water.[11] Beginning with the first waves of automobility in the 1910s and 1930s, the term pothole finally made its way into the urban vocabulary. After World War II and with the consolidation of the automotive age when the United States witnessed the increasing replacement of unpaved dirt roads by asphalted streets, the usage of the term soared in urban conversations.[12]

An urban pothole emerges when two factors together work on road surfaces, simultaneously exerting pressure on the asphalt from above and below ground: water and traffic. Potholes usually appear in the wheel paths of traffic, where road surfaces experience the highest pressure from the weight of cars and trucks. They are the results of either fatigue failure or raveling failure of the road surface. Fatigue failure mostly occurs on thin pavement when excess water accumulates in the base underneath the asphalt. Often meltwater that formed during the spring thaw or water from poor drainage weakens the soil under the pavement. As a result, the pavement flexes up and down with traffic until it starts to crack and break in several places. Raveling failure is a different process but equally depends on the interaction of water and traffic. It occurs when water washes away the adhesive asphalt films that hold together the stone aggregate, which leads to a gradual raveling away of the stone particles. Thinning out, the road surface eventually cracks.[13]

Early in the automotive age, streets commissioners, drivers, pedestrians, and politicians recognized that the problem with potholes was larger than traffic congestion caused by drivers slowing down to adapt to poor street conditions. Driving on pothole-filled roads also meant that cars, trucks, and motorcycles needed additional gas due to the constant acceleration and deceleration and the numerous "evasive actions" taken by drivers seeking to avoid potholes. Furthermore, if one is hitting these holes unaware and at speed, vehicles might suffer significant damage. In 1962, *Philadelphia Inquirer* reporters settled on Roosevelt Boulevard bridge across Pennypack Creek to highlight the "ghastly example of the moment" (i.e., pothole season). Due to the sheer number of potholes, it was impossible "to get across it without weaving back and forth or hazarding broken springs or wheels battered out of alignment."[14] Fatalities of both drivers and pedestrians could occur, leaving cities liable for repairs and damage compensations. In March 1982, for instance, a Chicago jury awarded a US$ 1.2 million in damages to a nineteen-year-old woman who lost a leg after being struck by a car whose driver lost control when they hit a pothole that had been left unfilled for three months.[15] In an attempt to reduce the number of tort claims brought against the city in connection with defective roads and sidewalks, New York City enacted a Pothole Law in 1979. This law required that the city had been notified about the pothole's existence before it could be found liable for any damages erupting from it.[16]

While to technical experts, every pothole was different, the main thing many Americans noticed was that there were "so darn many of them."[17] At the end of the 1970s, the Road Information Program, a Washington D.C.-based group backed by the automotive, road construction, and insurance industries, estimated that there were eighty-two million potholes across the United States, an estimated national average of forty-two potholes per mile. Furthermore, they described the average American pothole as sixteen inches in diameter and five inches deep.[18] At the time, most potholes were found on local roads and street systems,

rather than on federal highways. One reason for this difference was purely logistical, as the urban and metropolitan street mileage still exceeded the federal mileage of interstate highways. Another reason was that local road systems often covered underground facilities, such as water and sewage pipes: frequent pavement openings and surface access castings for manholes aggravated the problem of pavement maintenance. Potholes were primarily an urban road—not a federal highway—issue.[19]

As vehicle registration soared and people traveled more with their cars in the decades following World War II, potholes became an urban problem with a national dimension. Coupled to suburbanization in the United States, vehicle registration increased by seventy-five million between 1960 and 1980, while the population only increased by thirty million. By 1980 roughly, 50 percent of American households owned more than one car, resulting in more vehicle mileage traveled annually. This development particularly concerned metropolitan areas such as Philadelphia.[20] Already by the 1920s, buses had started to replace the city's streetcars. After World War II, public transportation ridership declined precipitously while automobile ownership increased, particularly among middle-class families.[21] In addition to these mobility changes, there was more heavy traffic on U.S. streets. From 1960 to 1980, the number of trucks on U.S. roads increased from nine million to thirty million, with the average weight of a fleet truck doubling. A study found that this weight increase alone could reduce the lifespan of asphalt by as much as 90 percent.[22]

As Americans openly discussed how their government could "put a man on the moon," while its engineers could not design "such a simple thing as a road," the U.S. Congress considered a special U.S.$250 million "pothole-bill" to help states and cities finance their road maintenance in 1978.[23] In 1979, a special Federal-Level Task Force was established to study the issue. Next, the U.S. military become involved. In 1981, the U.S. Army Civil Engineers from the Cold Regions Research and Engineering Laboratory (CRREL) released their results to the civilian public. Using primarily nontechnical language to reach the broadest possible audience, the *Pothole Primer* was meant to help elected officials and nonengineering town and city administrators "in understanding and managing their pothole problems in asphalt pavements."[24] Initially, the booklet was only meant for facilities in New England, but through hand-me-downs of copies, it soon reached other cities around the United States, and among them was Philadelphia.

Potholes and Seasonality

Philadelphians long had had their own rhythmic reading of the appearance of the road craters that had more to do with lived experiences than the technicalities of the *Pothole Primer*. Potholes were part of the annual cycle of urban living, marking the transition from winter to spring. They were an expression of Philadelphia's very own urban seasonality. "And just as there are first the snowdrops before the crocuses and the daffodils making their appearance in urban parks and gardens," journalist Edward Colimore from the *Philadelphia Inquirer* summarized the experience of pothole season in 1996, "motorists first brave piles of snow that bury cars and turn their driving into nightmares, before they run obstacle courses of rutted ice, slush, and growing puddles, until pothole season arrives with its bone-jarring, expletive-evoking craters on the roads."[25]

Seasonality, indeed, plays an important role in the emergence of potholes as does the circadian rhythm. A typical pothole already starts growing during the winter when traffic abrades weak spots in the roads' surfaces or when snow-removal equipment gouges it. Then, when melt water collects in depressions and cracks in the winter months, the freeze-and-thaw cycle accelerates the emergence of a pothole. Moisture that got through some small fissures in road surfaces freezes and expands breaking up the surface asphalt. While potholes occasionally also appeared at other times of the year, the climatic cycle of freezing and thawing ground, coupled with temperatures

below ten degrees Celsius/fifty degrees Fahrenheit provides textbook conditions for the emergence of potholes.[26]

This rhythm of road breaking and road repair in the transition period from winter to spring not just linked Philadelphia's asphalt to the ecological changes in the city's parks and people's gardens. It outdid them. Reporters soon established the narrative trope of the potholes being more accurate than nature: In 1962, a reporter from the *Philadelphia Inquirer* boasted that "surer than the reappearance of robins or bluebirds as a harbinger of spring in these latitudes is the blossoming of potholes in the roads."[27] This assessment was echoed a decade later when again the *Philadelphia Inquirer* commented how the city's "pothole purge [had become] a more certain harbinger of spring than a groundhog's shadow." Foregrounding the technological occurrences of a pothole, Philadelphia news outlets mocked the seasonal mode of other Pennsylvanian communities that celebrated spring with the old colonial tradition of Groundhog Day. Going back to the Pennsylvania Dutch, many communities still engaged in the practice of observing whether a groundhog saw its tail every year on February 2 to announce if spring would be early or late.[28] Rather than following the superstition (and tourist attraction) still present in many smaller communities around Pennsylvania, Philadelphians followed the technological failures of their infrastructure. Philadelphia local news entertained "street forecasters" that introduced ranges of "pothole probability" to the avid news reader.[29]

Yet pothole season was no positive expression of natural seasonality. Potholes marked the "season of broken car springs, splashed pedestrians, frayed and ragged roadways and tempers."[30] When an official pamphlet on the history of the Pennsylvania highway system, for instance, stated that "the roads of a country are accurate and certain tests of the degrees of its civilization," the Philadelphia *Inquirer* sarcastically responded in 1978 that Pennsylvania must be "reeling back toward the Stone Age."[31] The massive breakups of roads and road shoulders was a seasonal iteration of the recurring struggle between the "city" and "nature," which some voices interpreted as nature striking back at the built environment. To many Philadelphians, potholes were a sign of how nature was "at war" with their already dysfunctional city.[32] Squarely at odds with the famous first telegram sent by Samuel Morse "what hath God wrought," the *Inquirer* saw potholes as "nature's attempt to undo what man has wrought."[33]

Philadelphia's potholes stood in stark contrast to seasonal markers that came to fill other urban calendars in the United States in the twentieth century. Washington D.C., for instance, had the Cherry Blossom Festival to celebrate spring. Commencing in 1935 and commemorating the Japanese gifting of 3,020 cherry trees to the U.S. capital, the annual blossoming of these trees occasioned parades and social gatherings of all kinds, with family outings and picnics underneath the trees planted along the Tidal Basin and other places of the National Mall.[34] Portland, Oregon, in turn, had its annual rose festival, dating back to 1907. It marked the city's particular affinity to roses. The first rose bush had arrived in the Pacific Northwest in 1837 as a wedding gift to Anna Maria Pittman who had married missionary Jason Lee. Cuttings from that rose bush were then planted at Champoeg Park on the campus of Willamette University and in pioneer gardens around the region. A Portland Rose Society was established in 1888. They hosted the first "fiesta" with a parade and pageant in 1904. The parades were prime opportunities for Portland to cast itself as an innovative and future-oriented city. The first official Rose Festival in 1907 included an electric parade and showcased Portland's trolley system through illuminations and nightly fireworks.[35]

Philadelphia, meanwhile, became nationally renowned for the bad condition of its streets—although part of this story was also fabricated by local news that repeatedly printed complaints from out-of-towners on the city's road maintenance.[36] While cherry blossoming and the Rose Festival drew tens of thousands of tourists to Washington D.C. and Portland, Oregon, each year, urban seasonality did not provide Philadelphia with a favorable comparison, either aesthetically or economically.[37]

The Politics of Potholes

Unlike extraordinary events including earthquakes, tornadoes, floods, or blizzards, potholes are largely predictable, seasonally recurring phenomena. They are intricately linked to the annual freeze-thaw cycle in cities within the continental climate. Even the practices of street repairs followed a rhythm of urban pothole seasonality. Philadelphia's road construction workers described their job in the spring as "chasing potholes," followed by an almost-endless find and repair cycle that could "go on for hours, and for days, and for months" and would not stop "unless somebody takes Philadelphia apart and puts it back together again brand-new."[38] This regularity, or better seasonality, of potholes made the road craters an important tool to measure the success of political action. Had politicians invested enough in street maintenance? Had they implemented technological changes as suggested by engineers? In short, had they done their homework?

In the case of Philadelphia, city officials regularly got bad grades. To the imaginary character Sellers, potholes were a symbol of their city, if not their lives "falling apart."[39] Indeed, Philadelphia in the 1970s, the time of Caroll Sellers was in many ways a city "falling apart." Once the workshop of the world, the decades following World War II had brought profound social, economic, and political challenges for the city.[40] Philadelphians lived through two global oil crises and the advent of Reaganomics; they struggled with deindustrialization and rising unemployment; they experienced racial tensions, "white flight," and the radical activism of MOVE.[41]

Philadelphia's dire financial situation made street maintenance difficult. Philadelphia experienced rapidly rising unemployment and a shrinking tax base as a result of major employers leaving the city over the 1960s and 1970s, alongside the wealthier and typically white middle class. Already by 1972, the city faced a deficit of about U.S.$60 million.[42] By the late 1980s, Philadelphia's city government could no longer pay the salary of all its staff and was forced to lay off 2,400 employees, amounting to nearly 10 percent of its workforce.[43]

Street maintenance, in turn, was expensive. In 1979 alone, the estimated road repair costs for potholes stood at U.S.$165 million.[44] Lacking better alternatives, Philadelphia city government looked to its citizens to help throughout pothole season. As early as 1956, Philadelphia's Street's Commissioner David M. Smallwood reached out to Philadelphians to tell him where the potholes were. He received about 1,000 postcards.[45] By 1971, the city had set up a special "Pothole Phone," which in the middle of the season received 1,500 calls over the course of two days alone. Calling in toll-free, people could report if they had spotted a pothole, leaving a description of its size and location.[46] This would help little, however, in getting the roads fixed if the city had no money for repairs. Starting in 1957 with Streets Commissioner David M. Smallwood, Philadelphia politicians made sure citizens understood potholes as a regular, seasonal, expression that could not (need not) be avoided.[47]

Philadelphians themselves settled on dark humor as their coping mechanism for the recurrence of potholes embedded in a never-ending process of breaking and mending. Four years after the Carol Sellers story, the *Philadelphia Inquirer* ran the first reoccurring "pothole story contests." They received hundreds of responses from Philadelphians. Assembling "True, Fantasy, and How Big Was it?" stories, most Philadelphians revealed their understanding of potholes as an entry into a mythical world of large holes swallowing entire trucks, providing an elephant and a rhinoceros the opportunity for a swim, or spitting out large fortunes of Philadelphia mob money previously held underground.[48] One reader encountered a pothole that was so deep that someone was selling pack-mule tours to the bottom and back; another man said he fell into a pothole so deep that he could see the bottom line of the Philadelphia school budget deficit spending. Diana Bones of Springfield, finally, wrote about a pothole so deep that when she looked inside, "I swear, I sniffed a whiff of wanton."[49]

Conclusion

To this day, potholes are important to how residents of Philadelphia relate to their city and its urban environment. As recently as spring 2023—only some months prior to writing the first draft of this text—Philadelphia local news would run a series on pothole season and the city's "famous pothole problem," circling around the familiar questions of "who is the biggest pothole gremlin in the city . . . new construction and the constant digging into the roadways or Mother Nature?"[50] In spring 2024—when revising this text—Philadelphia news predicted "2024 could be the worst pothole season ever in Philadelphia."[51] The urban environmental angle on pothole reporting, this shows, has lost nothing of its currency. The potholes of Philadelphia continue making history.

Potholes first became an important marker at winter's end, announcing the seasonal transition to spring in the postwar, car-dependent city of Philadelphia during the consolidated automotive age in the United States. The road craters became so frequent and so common during that time that the news soon coined Philadelphia's own season—pothole season: the time of the year of broken cars, splashed pedestrians, and frayed tempers. It was a season fundamentally different from other urban environmental seasons in the United States, such as in Washington D.C. or Portland, Oregon, that connected to aesthetic pleasantries of blossoming cherry trees or roses. In Philadelphia, pothole season was both the time when nature was attempting to "undo what man had wrought"[52] and when infrastructure's response to changing urban climates were a more accurate harbinger of spring than nature itself. Pothole season, finally, was also when the city government yet again failed to adapt quickly (enough) to the emerging craters. In the end, Philadelphia's pothole seasons does not provide an example of successful urban resilience.

It does provide a good example, however, for the productivity of seasonality as a conceptual tool for both urban and environmental history. Thinking through seasons allows us to explore new avenues of human-environment relationships in the urban setting. It illustrates how strongly cities are connected to slowly but regularly occurring climatic changes and how city dwellers read and interpret those environmental changes through their infrastructure.

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