Fecha de recepción: febrero 2024
Fecha de aceptación: marzo 2024
Versión final: abril 2024

From Pittsburgh with Love: A Postcard

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Abstract: In the essay I explore Pittsburgh, Pennsylvania's regenerative potential through a deep historical lens, advocating for a mode of ecological literacy that breaks down the distinction between person and place. I emphasize the importance of discovering and elaborating actions that resonate between geological and human cultural identity as vital in pursuing sustainable transitions. I contrast Pittsburgh's pre-modern cultures with its more recent industrial past, in order to highlight the inherent wisdom of Pittsburgh-based children's show creator Mr. Rogers' ethic of neighborhood-based love for empowering such processes.

Utilizing an auto-ethnographic approach, I blend personal narratives with diverse sources, including historical, scientific, and cultural references. I propose a model of place-based and participatory sustainable transition that expands Manfred Max-Neef's analytic, human-centric development framework to include non-human needs, like geological processes. Taking inspiration from geologic, biologic, and human cultural forms that express branching, complex yet self-similar part-to-whole relationships like the river system, the lung, the tree, and burial practices, this approache centers on developing actions that synergistically satisfy needs within and among diverse cultures, both human and non-human, through emergent, sedimentary processes and fractal forms.

I present Pittsburgh as a paradigm for cities navigating modern development challenges by offering a situated, place-based methodology for building resilient, regenerative communities and inspiring similar sustainable urban futures.

Keywords: Participatory Design - Place Making - Urban Resilience - Ecological Literacy - Urban Morphology - Social Ecology – Emergence - Indigenous Practices - Design Interventions - Transition Design

[Resúmenes en castellano y en portugués en las páginas 115-116]

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From Pittsburgh with Love: A Postcard
Pittsburgh: City of Transitions

Dear Neighbor,
We made it! We are here –Pittsburgh, Pennsylvania, USA–City of Bridges, Steel City, Paris of Appalachia, or as it has often been repeated– "Hell with the lid off." As I will share, this city's story stretches far beyond its pivotal role in global industrialization and the famed neighborhood of hometown hero Mr. Rogers. Pittsburgh's full story grows from the unique character of the place that evolved over millions of years. However, if you have heard of Pittsburgh, it may be because of their American football team, the Steelers. You may have met one of the tens of thousands of fans who scattered across the U.S. as the city's once-dominant industrial economy sagged over the last half century. Pittsburghers left the city to build lives and Steelers bars across the country and the world. Although none of them opened a bar, my mom and three of her four siblings were among those who left.
I am writing this meandering note to share early reflections on approaches to cultivating ecological literacy in Pittsburgh after spending a spring immersed in its charming streets and enchanting hallows. With fresh but far from unbiased eyes, I see the city's sustainable transition rooted in the region's deep geologic history with the unexpected help of one of the city's most beloved citizens, Mr. Rogers. I speculate that the expression of love taught by Mr. Rogers can provide valuable insights for sustainable transitions as it resonates with the expression of organic and inorganic life in the regions sedimentary rock river systems and similar emergent structures. In this winding and branching auto-ethnography, I try to weave together a range of formal and informal sources, from family lore and pop culture to chemical equations and Indigenous burial practices. In the following presentation of the curiosities I uncovered, I conclude that places have needs like humans and that sustainable transitions require a synergistic alignment of those practices that satisfy human and non-human needs.
Pittsburgh belongs to a motley crew of American cities endearingly or jeeringly referred to as Rust Belt Cities. Pittsburgh's rivet shines slightly brighter among the deindustrialized

and depopulated urban cores of the American Midwest that constitute this club. With the subtle polish of a growing service sector centered around education, healthcare, and finances, further buoyed by a growing technology hub and a population growth trend that, before COVID-19, threatened to peek into the positive, Pittsburgh's best days may be ahead of it. Following the decline of the heroic steel industry with its dueling iconic images of masculinity and patriarchy in the millworker or iron man and the industrial capitalist, the city also embraced a softer embodiment that resonates well with its concurrent economic shifts to health and education – the bright, warmth of a smiling, singing, loving Mr. Rogers. This latter model, with his radical approach to public media, holds vital lessons for the city's resilient future. Mr. Rogers deploys a method of slow sedimentation, the antithesis of violent extraction, steelmaking, smelting, and other manufacturing.

As a child and young adult, I often visited my grandparents and our extended family in Pittsburgh's East End. I grew up in Denver with a Steelers "Terrible Towel" (pronounced "terrble taul" in the local inflection affectionately referred to as "Pittsburghese") in a household where we dipped our pizza in ranch dressing the Pittsburgh way. However, the mythical connection between Pittsburgh and Mr. Rogers captured my imagination more than the iconic yellow rally towel or the quirky use of condiments, as it would any child who watched his shows. In a particularly noteworthy anecdote, my aunt's purse went missing when my mother's family experienced a burglary in her childhood. When a neighbor arrived at the door, having found it discarded somewhere nearby, Mr. Rogers gracefully returned the bag.

While Mr. Rogers does not focus on ecology or sustainability as primary themes of his show, his ethics of care contain valuable lessons that counter the prevailing technocratic approaches to sustainable solutions to environmental and social "wicked problems" (Rittel & Webber, 1973). As Mr. Rogers put it in one of his many, widely published quotes: "We live in a world in which we need to share responsibility. It is easy to say, 'It's not my child, not my community, not my world, not my problem.' Then there are those who see the need and respond." I imagine the readers of this journal to be among the latter group. However provisional, I share the following reflections to join in that responsibility and respond. I hope the following portrait contributes a unique, autonomous perspective of a place that might reveal vital synergies among other places and cultures.

The Ecological Literacy of Mr. Rogers' Neighborhood

The growing list of literacies, in addition to reading and writing (media, financial, ecological, etc.), underscores the expanding set of essential capabilities required to navigate the complexities of modern life effectively. These literacies unlock potential. They interconnect in a self-reinforcing web of capacities that empower individual and collective action. While there has been growing attention to emotional intelligence, capacities routed in cognitive, critical faculties tend to receive more attention due to their perceived strength in helping understand the complex systems that define modern society. Ecological literacy stands out as particularly demanding of emotional faculties. To develop an ethic and prac-

tice of environmental care, one must develop the emotional capacities that enable empathy and awareness of oneself and others. These are among the core teachings of Mr. Rogers.

Between 1968 and 2001, Fred Rogers wrote, produced, starred in, and voiced characters in a children's television show called "Mr. Rogers' Neighborhood" on public access daytime television in the United States. With shoestring budgets, a formulaic structure, and a fearlessness to take children and media seriously, his programming impacted youth from the Later Baby Boomers to early Gen-Z. The show had a simple message: you are worthy of being loved and capable of loving. These emotions washed over viewers daily at an unhurried pace that demanded being present. From this bedrock, Fred Rogers invited children and their adult companions to work together to embrace the complexities of being emotional beings through subjects that ranged from divorce to assassinations and war. With an ethic of care and curiosity, humans of all shapes, sizes, and colors and an array of human and non-human puppets shared intimate moments of kindness and courage, often accompanied by a song.

The show's internal structure was as revolutionary as its message and pace. The show exists in two simultaneous spaces: the "real" neighborhood where Mr. Rogers introduces the show's theme, community members and friends come to visit and help Mr. Rogers process them, and the "neighborhood of make-believe," where puppet and human characters grapple with the emotional implications of the theme through a straightforward plot. With this uncomplicated design, the show's form models the duality of interior individuality –the personal– and exterior collectivity –the social– and the complexity of navigating conflicts in both spaces. Furthermore, this structure challenges the notion that the mind and the body are somehow split, discrete, and irreconcilable spaces. Mr. Rogers' Neighborhood represented individuals as part of a nested whole. The self, just like Mr. Roger's set, is a series of fluid spaces that include both our inner imaginings and the world around us. Internalizing this continuity should be core to ecological literacy.

The elegant complexity of Fred Rogers' approach to the form and content of Mr. Rogers' Neighborhood presents conceptual and strategic value for Pittsburgh's sustainable transition and for the field of Transition Design more broadly to activate societal change toward not only sustainable but equitable and desirable futures (Irwin, 2015). It is not just that Fred Rogers expresses the complex reality the environment shapes individuals, be they an adult or a child, but that those individuals shape the environment in turn. Personal identity and collective experience link inextricably in place. More importantly, his methods resonate with the regenerative dynamics of the region that trace back to the deep geologic history of the "neighborhood." Specifically, for Mr. Rogers, love, as it circulates through interconnected and harmonious spaces, enables individuals and communities to achieve their fullest potential. This process mirrors the long evolutionary process of sediments and nutrients flowing through the elaborately unfolding spaces of the region's river systems. These qualities present a robust framework for understanding how persistent, incremental action, like the expression of love, can produce profound impacts at broad scales and how the resilience of such actions may grow from their resonance with this underlying historical, place-based, regenerative logic.

To test this hypothesis, I contrast the relative resiliency of modern regional industrial culture with pre-modern nomadic cultures in the region before concluding that Mr. Rogers'

approach to human flourishing, which resonates more closely with the indigenous models I explore, will likely produce more resilient and sustainable outcomes that the extractive approaches that defined the region's recent past. To differentiate the qualities of these cultures more concretely, I adopt and extend the pioneering work of Chilean economist Manfred Max-Neef, who provides a robust and holistic framework for understanding human needs among a broad web of potential satisfiers. For Max-Neef, human needs are universal and unchanging throughout human history. According to Max-Neef, what changes is culture – the expression of the unique set of ways that humans satisfy their needs in a specific time and place (Ekins *et al*., 1992). While Max-Neef identified and named a wide range of categories and qualities associated with these satisfiers, for my argument, I focus on two: *singular satisfiers*, those satisfiers that only address a single need (i.e., the Big Mac eaten alone in a car for subsistence), and *synergistic satisfiers*, those satisfiers that address a multitude of needs simultaneously (i.e., the home-cooked meal eaten with family around a table for subsistence, affection, belonging, identity, and understanding). For Max-Neef, specific satisfiers can address diverse needs, and evolving these "synergistic satisfiers" can empower communities to flourish without succumbing to market dynamics that extract value by monopolizing singular satisfiers of individual needs (Ekins *et al*., 1992). Synergistic satisfiers are inherently more efficient and resilient due to their networked quality.

With this definition of culture and a method for evaluating resiliency through the lens of satisfiers, I extend this framework to describe how non-human dynamics in systems can similarly express patterns equivalent to Max-Neef's definition of human culture through the myriad ways they satisfy their needs. To imagine a form of ecological literacy that might animate sustainable transitions, I extend this framework beyond human needs by situating human needs within a broader system of non-human needs. Suppose people and places are mutually co-dependent, as expressed so eloquently in Mr. Rogers' Neighborhood. In that case, satisfying human needs must also include the satisfaction of non-human needs, for example, processes of erosion and deposition or the circulation of minerals that fulfill the need for water to distribute energy efficiently. Therefore, a sustainable transition to a more resilient culture requires aligning synergistic satisfiers among human and non-human needs. I will argue that identifying and methodically applying specific actions with qualities that represent cross-cultural, human and non-human, organic and inorganic synergies will enable resilient, evolutionary transitions. Taking inspiration from Mr. Rogers, I anchor the neighborhood as a vital place to pursue and enact such cultures.

To capture the connection between love, water, and flourishing in a visual mnemonic, I offer the following image from an enchanting scene from the documentary "Won't You Be My Neighbor." A smiling Mr. Rogers floats in a pool, crouched in a near fetal position with his toes twinkling above the water's surface. I immediately want to be with Mr. Rogers in the pool — smiling, swirling, suspended. I want to return to the weightless sensation of being a child. Held in a loving embrace, Mr. Rogers expresses joy and belonging. Harnessing that feeling in so far as it captures floursing among persons and place can inspire new models of ecological literacy and sustainable transitions *(See Figure 1)*.

Figure 1.
Freeze frame from the documentary 'Won't You Be My Neighbor' (Source: 'Won't You Be My Neighbor' (Neville *et al*., 2018).

Let us jump in the water together. I extend Mr. Rogers's invitation to become close in this work with the recital of his greeting song *"Won't You Be My Neighbor"*:

"It's a beautiful day in this neighborhood,
A beautiful day for a neighbor.
Would you be mine?
Could you be mine?
It's a neighborly day in this beauty wood,
A neighborly day for a beauty,
Would you be mine?
Could you be mine?
I have always wanted to have a neighbor just like you,
I've always wanted to live in a neighborhood with you.
So let's make the most of this beautiful day,
Since we're together we might as well say,
Would you be mine?
Could you be mine?
Won't you be my neighbor?
Won't you please,
Won't you please?
Please won't you be my neighbor?"

Unsustainable Futures

Investing in sustainable transitions is self-serving, not self-sacrifice. We defended our family's decision to move to Pittsburgh for me to start the Ph.D. program in Transition Design at Carnegie Mellon University as practical, however crazy and challenging. Based on

current climate projections, Pittsburgh is less likely than Denver to suffer acute climate change-related catastrophes. While the Ph.D. pulled us to Pittsburgh, the increasing frequency of extreme climate events in Denver also pushed us. By leaving the increasingly extreme heat, smoke pollution, and threat of fires in the drought-ridden American West, we voluntarily participated in the immense climate-motivated migration pattern that will define the population dynamics of this century. Our access to resources allowed us to move proactively and of our own volition, a privilege that few have; however, leaving was still painful.

Solastalgia refers to the emotional and psychological distress felt due to the environmental degradation of one's home. Experiencing such loss provides an acute and embodied experience of otherwise abstract and cerebral concepts like climate change. With wildfire season now spanning seven months from May to November, air quality could and would deteriorate rapidly to be "unsafe for sensitive groups," which includes the elderly and small children. With the arrival of our two sons, on any given day the outdoor environment in Denver directly threatened the safety of half our immediate family. In late December 2021, the Marshal fire started in a suburban housing development just north of Denver. The fire quickly spread with extreme wind, burning twenty-five square kilometers and destroying over 1,000 homes in an afternoon. That community looked just like where my family and friends live. The perpetual threat to my home in Colorado haunts my optimism for Pittsburgh's regenerative future.

Pittsburgh has its own ghosts. That fate or physics would spare Pittsburgh the worst of climate change rehearses the injustice of greenhouse gas pollution, namely that impacts are intergenerational and that there is typically a spatial mismatch between where pollution occurs and where communities experience the pollution's harm. More precisely, the immense quantities of coal burned in Pittsburgh played a significant role in growing the economic prosperity of the American Gilded Age and beyond. Emissions from Pittsburgh's heyday remain in the atmosphere today, spawning climate catastrophes far from its enduring mansions and verdant hills. Since the middle of the 18th century, the United States has produced a quarter of global carbon dioxide emissions (Ritchie *et al*., 2023). These emissions generated vast wealth, as Pittsburgh's magnificent mansions still attest. Pittsburghers, however, have not always been the beneficiary of such spatial mismatching. While the region has made noteworthy progress in addressing the legacy of industrial pollution, urban air quality remains among the worst in the country. While carbon dioxide is an invisible and odorless gas, the coal-based manufacturing that once dominated the region produced ash and soot known to be so severe that it would block out the sun.

At the height of its industrial power, with every meter of river edge congested with coal barges and blast furnaces in the flats of every river bend, even a stroll in the city might soil a shirt. Businessmen in suits would bring a pressed white shirt to work in addition to the one on their back to uphold the expected crisp, clean appearance of trustworthiness into the afternoon and evening hours. My grandfather, a renowned jokester and community man, walked proudly among them. In the daily grind of the work week, classes of all strata could not easily escape the soot. So pervasive was the problem that the homes of Pittsburgh's elites often hosted closets with elaborately nested doors and drawers. These fortified built-ins would fend off the sedimentation of soot on prized linens. Decorative,

untarnished cloths, like pressed white business shirts, projected power and status. These elaborate closets, however, were not the primary antidote to polluted air-escape was.
Foreshadowing current climate escapism, as manufacturing grew in the second half of the 19th century, so did the distances required for wealthy, industrial families to escape unsightly and unhealthy waste products of their capital accumulation. In extreme cases, elite families fled to Canada as far north as the rails and the steamboats could get them. Escaping to the north meant outrunning a carbon shadow below ground in the coal beds and above ground in a haze of soot. The Canadian Shield, where topsoil measures in centimeters, contains negligible coal deposits and an abundance of pristine, granite-rimmed lakes. Tourism dollars attest that "lake country" is not great for industrial production but perfect for leisure summer escapes.
In each context, geology and the non-human culture it expresses directly impacts human cultures. The process of successive glaciations over millions of years shoveled and deposited the rich sediments of softer stone into the inland sea further south. This sedimentation helped prime the region around Pittsburgh. The vegetated edges of that sea would later become the raucously diverse swamp and bog ecosystems and, much later, fossil fuels. At the continental scale, geology and hydrology dictated human dynamics from the siting of industrial centers to summer homes. Far from passive actors, however, humans began to alter the expressed cultures of this legacy to such an extent that modern geologists have proposed a new geologic epoch, the Anthropocene, to delineate the immense human-caused impacts on global ecology from climate change to mass extinction. The mutually dependent, co-creative connection between human and the environment persists across vast spatial and temporal horizons.

Love's Antithesis

For all the love that emanates from Mr. Rogers and his neighborhood, wars play a prominent role in shaping Pittsburgh's past. Competing claims to resources and power have long been a forcing function for technological innovation. In post-revolutionary America, enduring conflicts related to European claims to the continent's resources accelerated energy extraction and the adoption of new transportation technologies, including railroads and canals. The context of war set the stage for the American Industrial Revolution and the immense amount of coal and later oil it would take to fuel it. Pittsburgh was at the center of this so-called progress.
Before the American War of Independence, the first bituminous coal mining in North America began on the bluffs overlooking Fort Pitt, and later the city of Pittsburgh, at the confluence of the Monongahela River and the Allegheny River, where they form the Ohio River. Following its construction during the French and Indian War, European powers fought for control of the Ohio River valley in the middle of the 18th century. While visiting the Fort Pitt Museum with my family, whose building occupies part of the original fort's footprint at the edge of downtown Pittsburgh, a retired public-school teacher turned volunteer tour guide in a half-meter tall Steelers hat and loop earrings proudly stated, among

many other Pittsburgh superlatives, that the fort would be the largest fort ever built on the continent by the British. She was proud of Pittsburgh for having the giant fort, not that the British built it for war. The power-hungry could not ignore the site's strategic position in the continent.

The three rivers at Pittsburgh provided access to the country's interior, and in conflict, whoever maintained that access would gain the advantage. As a Google reviewer succinctly put it: "A great historical spot for Colonial Revolutionary War, French and Indian War, and the War of 1812 military enthusiasts." Visiting the site for battle, many generals from many nations preceded such history buffs with their own enthusiasm. The succession of forts at that location reveals the strategic importance of the waterways for inland transport in the 18th century. War, the antithesis of love, fueled the dynamic that would mechanize the rivers and change the course of global history.

When Napoleon Bonaparte, an aspiring emperor but then consulate of France, agreed to sell 2.2 million square kilometers of the North American continental interior, including the Port of New Orleans at the mouth of the Mississippi River to President Thomas Jefferson in 1803, he handed the newly minted American's a time bomb with the British who were already in a power struggle with France following the French Revolutionary War. When President Jefferson charted the famed Louis and Clarke expedition to explore the territory the same year, the trip began in Pittsburgh by constructing a keelboat for the job and setting out down the Ohio River. The American's new ownership over and exploration of the western continental interior would bring the British back to now U.S. soil to fight another war. When the British extended its trade embargo on American imports and exports during the War of 1812, it spawned an energy crisis in the new country, which relied heavily on British coal imports.

Without imported coal, a race to find, extract, and transport domestic coal reserves to replace British imports accelerated exploration and extraction efforts at a desperate pace. This acceleration led to innovations in transportation and corporate structures that would soon recast Pittsburgh as a different type of leading character in the new century. The race to the interior led to the Great Lakes or the Ohio River. In a massive win for the Great Lake the Erie Canal connected New York with Buffalo on Lake Erie first. The canal's success turbo-charged pressure to connect the Ohio River with the competing ports in Philadelphia and Baltimore, each desperate for their own windfall. This race birthed the first railroad in the country, the Baltimore and Ohio Railroad, and simultaneously what would be largest railroad network on Earth, the Pennsylvania Railroad. Railroad development would radically accelerate the American Industrial Revolution and continental expansion. These rail systems mechanized the rivers by divorcing the flows of materials from the natural dynamic of the ecological system, with its frustrating seasonality and indifference to commerce, and reinscribing those same spaces with straighter vectors for increased control and speed.

Pittsburgh would no longer be the passive recipient of a naturally strategic position on the map; instead, it would begin to actively author mechanical rivers of steel indifferent to hydrology and accountable only to speed. The Pennsylvania Railroad connected the port at Philadelphia with the port at Pittsburgh. The completion of the immense steel, overland bridge joined the two largest cities in Pennsylvania around the mid-19th century, replacing

the millennia-old dominance of the distributive capacity of gravity, water, and sediment for the greased lightning of the railroads. The Pennsylvania Railroad would grow into the largest rail network in the world and become the largest publicly traded company on Earth, with an alleged operating budget more expansive than that of the U.S. government at the time. That freight and wealth flowed through railroads with deep roots in Pittsburgh. The radical impact of the new transportation paradigm was evident almost immediately. As Ulysses S. Grant, who would later become the general of the Union Army during the American Civil War, remarked at age 17 as he rode a railroad traveling east from Ohio to attend the famed military academy at West Point in 1839, "this seemed like annihilating space" (Grant, 1885). Grant experienced a vital concept that Marx would not theorize for over a decade. In his notes from 1857, Marx identified capital's unrelenting demand for "the annihilation of space by time," rendering it frictionless and free of cost (Marx, 2005). As the birthplace of American industrial capitalism, Pittsburgh and the mechanized Ohio River system was the epicenter of this transmutation.

So Called Great Men

Popular propagandist history credits the incredible ascendancy of American wealth and prosperity to supposed "great men." Fictionalized versions of such men star in their own ascendant stories through serial docudramas like History Channel's "The Men Who Built America." Tellingly, "The Men Who Built America" storylines swirl around Western Pennsylvania. Andrew Carnegie of Carnegie Steel Company and J.D. Rockefeller of Standard Oil both ruthlessly exploited regional fossil fuels and eager laborers as they selfishly sparred to become the wealthiest men on Earth, a position they would both claim. American mythology idolizes these embodiments of strength and progress. However, these mortals merely exploited the eons-old regenerative system only to undermine it by negating its evolutionary logic. They did so without returning that wealth to the laborers and, more importantly for this argument, the sedimentary systems responsible for the demanding work. The slow erosion and sedimentation of organic and inorganic matter throughout a complex and evolving web of connected spaces gives the system strength and regenerative capacities. The railroads, which reinscribed rivers, would soon leap over them, indifferent to their life-giving processes. The region and the hundreds of thousands of laborers would pay the price *(See Figure 2 y 3)*.

2 **3**

Figure 2. A non-hierarchical representation of the Ohio River Basin flow lines reveals the region's hydrology's complex, nested, emergent fractal geometry. Source: Created by the author from TIGER/Line data at https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html
Figure 3. Steel bridges that cross water or water reliefs bypass the region's hydrology, negating its fractal geometry's emergent logic. Source: created by the author from the National Bridge Inventory data at https://www.fhwa.dot.gov/bridge/nbi.cfm

Andrew Carnegie was the first to pioneer the use of industrial-scale steel in bridge construction. Carnegie's Pittsburgh-based Keystone Bridge Company's implementation of steel members to cross of the Mississippi River at St. Louis would catapult a new era of modern manufacturing that depended on access to rivers, coal, and railroads in Pittsburgh as Carnegie later consolidated the steel industry under the behemoth Carnegie Steel. Due to steel's superior strength and fire resistance, demand for steel bridges, rails, and later buildings skyrocketed. Bridges built in steel helped open new arteries for expanding rail lines, which expanded access to more coal and iron ore in a self-escalating cycle. Carnegie would sell his steel empire to become the wealthiest man on Earth and a renowned philanthropist. Many important public and private institutions in Pittsburgh, including the university where I study, are direct benefactors. Dispite the generosity, he also left Pittsburgh choked by soot with river banks stained with blood long before carbon's climate impacts and the enduring mechanizing of the river system, as I explore, would further complicate his legacy.

Incredibly, Western Pennsylvania also birthed the modern oil industry simultaneously. The region's unique geography created the immense quantity of life required to produce coal in the Carboniferous period (roughly 359 to 299 million years ago). Also, it produced the conditions for oil and natural gas to form in the earlier Devonian era (419 to 359 million years ago), with some dating to the Late Ordovician (roughly 458 to 444 million years ago). It is an old, lively neighborhood. The discovery of oil and the invention of a drilling process for its extraction up a tributary of the Allegheny River above Pittsburgh would

shortly catapult J.D. Rockefeller to his moment as king of an unrivaled extractive empire as he leveraged volatile markets to vertically integrate the production of refined kerosene for lighting and other byproducts. Western Pennsylvania oil reserves fueled the creation of Standard Oil and kickstarted the neo-colonial program of global extraction and consumption we live with today. While these formations exist elsewhere on Earth, Pittsburgh's unique geography and hydrology, geopolitical pressures of war, capitalist competition, and corporate monopolization conspired to ensure that the immense resources would generate unimaginable wealth accumulation in the hands of a celebrated few. However, the rivers and the rocks generated wealth in the region, not so-called great men. Mixing organic and inorganic matter allowed life to flourish in a nested, regenerative system in the same place for millions of years. Yet popular media insist on retelling the stories of extractive humans, not the regenerative, sedimentary systems to which their bounty truly belongs.
With the subtitle "How five self-made men transformed the U.S. into a global superpower," these modern cultural products bolster a cringeworthy, pervasive, and problematic ideology of American exceptionalism rooted in "great men" of a specific masculine mold. In the background, along with the innumerable unsung heroes, including those who were not white or men, is the place that enabled everything. Sensational but hollow cultural products like the dramatized histories in "The Men Who Built America" and similar shows represent the corrupted singular satisfiers that, in their emptiness, constitute poverty in the innate human need for leisure. They also represent corrupt collective singular satisfiers for American identity. Such poverties contribute to social pathologies of "depravity," not enablers of "potential," to use Max-Neefs terms. The fractured polarization of modern American society is symptomatic of this depravity of monopolized singular satisfiers *(See Figure 4)*.

Figure 4.
A dramatized image of the supposed "Men Who Built America" from the History Channel Show "The Men Who Built America" marketing material. (Source: https://www.amazon.com/The-Men-Who-Built-America/dp/B07F232GH5)

Contrast the dramatized image of the "men who built America" with the image of Mr. Rogers in the pool. Carnegie built a vast personal fortune extracting resources from the region, mechanizing its evolutionary intelligence, converting its rivers into conduits – strait rails for raw material – smoothing and straightening the system for speed. The rivers evolved to efficiently dissipate energy through erosion and sedimentation, not bend to the bidding of immoral men. Mr. Rogers, on the other hand, cultivated a vast public wealth of emotional and moral values among his millions of viewers. His lessons methodically deposited seemingly modest resources, a "daily expression of care" as he convincingly justified his work when petitioning the United States Congress to maintain its funding for public television in 1969 ("Extension of Authorizations Under the Public Broadcasting Act of 1967, Hearings before the Subcommittee on Communications of the Committee on Commerce, United States Senate, 91st Congress, April 30 and May 1, 1969 Note," 1969). Video footage of Fred Rogers' appeal reveals the strength of his approach as he argues for the value of such programming (danieldeibler, 2015). This method resonates with the life-giving regenerative logic of the region's deep geologic history.

Each show unfolded unhurried yet targeted among a near-constant flow of authentic expression of love and tenderness that helped characters navigate challenging emotions. This expression of care emulates the rhythmic flow of water – the rippling of waves, the tugging of tides, and the unfolding of a river – a process that brings resiliency and life to ecological systems. The slow rhythmic settling of organic and inorganic particles in oceans and later rivers of the Pittsburgh region have made it such an oasis for life for eons. Fittingly, the "Men Who Built America," like the animated children shows that Fred Roger's critiques in his Congressional speech, take an inverse approach with a "bombardment" of dramatic music and quick cuts and zooms timed to the next commercial break ("Extension of Authorizations Under the Public Broadcasting Act of 1967, Hearings before the Subcommittee on Communications of the Committee on Commerce, United States Senate, 91st Congress, April 30 and May 1, 1969 Note," 1969).

Mr. Rogers presents an alternative image of American masculinity while revealing that television can be a force of empowerment, not manipulation. In Mr. Rogers' Neighborhood, there is no "fourth wall," Mr. Rogers enters into direct dialogue with the viewer. Viewers become active co-creators and participants in the show. The love expressed in the show is mutual and shared authentically despite the mediation. Far from the singular satisfier for leisure, this radically different approach to media represents a synergistic satisfier of a broad range of human needs, including affection, understanding, participation, and identity. This complex fulfillment of needs occurs through a slow, repetitive, and incremental process. The characters and the show of Mr. Rogers' Neighborhood generate potential in the viewer over time. In this way, the culture of Pittsburgh and its neighborhoods, the context that formed Fred Rogers and that he formed, express the efficient and resilient networked synergic satisfiers that generate human flourishing, much like the region's hydrology.

Non-Human Regenerative Cultures

Outside of the clear place-rootedness of the show, how does the culture expressed in Mr. Rogers' Neighborhood connect to the broader cultural contexts, and how does that connection strengthen its efficacy? The sedimentary process in which Mr. Rogers deposits sentiments of love and care into the households of children and their families resonates deeply with how organic and mineral nutrients distribute through river systems. As far as the river systems express a need to balance energy distribution, a point we will focus on shortly, the branching unfolding of erosion and sediment deposition in the river system hints at the geologic culture of the place. Mr. Rogers' approach to media resonates with the idea that geologic culture signifies an alignment between human and non-human cultures. To better understand how to evaluate such resonance, we must first define the aspects of this non-human cultural expression more clearly.

Sedimentary rock has an intimate relationship with the Earth's surface compared to its cousins, igneous and metamorphic. Sedimentary rock is terrestrial, surface-dwelling like us. Like us, water defines every aspect of sedimentary rocks. Given these similarities, it is unsurprising that sedimentary rock, among all supposedly inanimate beings, expresses its culture legibly within a human framework. Not only is sedimentary rock formed in analogous processes to other life, but its evolutionary expression also creates life through regenerative processes. The expression of these processes defines the geology and hydrology of the Pittsburgh region and the broader Ohio River basin.

Sedimentary rock, like all life, starts suspended in seawater. Oceans suspend organic and inorganic matter, which settles in thin layers on ocean bottoms. These ocean edges expand and contract with plate tectonic shifts and dramatic climate change cycles, adding additional cycles and layers of sedimentation and causing the emergence of coastal ecologies and freshwater flows. The riotous vitality of these coastal areas, where marine and land-based life were among their most impressive density and diversity, slowly settled into alternating layers of once-living material and inorganic bits of minerals, sand, and other small particles. Swamps and different ecosystems emerge, and the same cyclical process also buries them. Over eons, pressure builds, and sedimentary rock is born. We call such rock with exceptionally high organic content coal.

Sedimentary rocks –sandstone, shale, and limestone– are porous; they accept water. As water seeks a path of least resistance across sedimentary rock formations, water absorbs into the rock, and the kinetic force of the water's movement dislodges, suspends, and deposits sediments in a dynamic self-generating process that distributes energy and nutrients throughout the entire hydrologic system replenishing conditions for life. The geologic form is mutually dependent on and co-created by organic forms as living ecologies take root. These resonant organic and inorganic cycles create the conditions for present and future flourishing. When squinting through the lens of geologic time, organic and inorganic materials lose their clear distinction. Even a frozen image conflates the inorganic with the organic. Guess the origin of the following image *(See Figure 5)*.

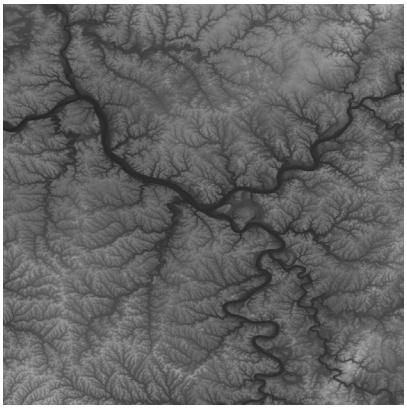

Figure 5.
An assembled digital elevation map of the Pittsburgh region. The confluence at the center of the image is where the Allegheny River and Monongahela River meet to form the beginning of the Ohio River at Pittsburgh. Source: Created by the author from United States Geologic Survey data at https://www.usgs.gov/the-national-map-data-delivery/gis-data-download.

The Latin root of animal, "anima," means "having breath." Indeed, the kinetic motion attributed to living, animated beings flows from this apt name. Yet to attribute this quality to living beings alone is disingenuous. Animal lungs like ours are only capable of half of the requisite exchange, and we require other organisms, like trees, to do the rest of our breathing. If breath represents the soul as it does in many religious and spiritual traditions, respiration and the carbon cycle suggest an expansive and compelling cosmology outside the scope of this note. However, tracing the primary contours of these essential processes provides insights into how incremental action can evolve emerging forms that represent forms of human and non-human synergistic satisfiers and resonant cultures necessary for sustainable transitions.

Everything starts with the sun. Solar radiation provides energy that converts carbon dioxide and water into glucose, a simple sugar, and the oxygen that animals breathe. This process is the famed photosynthesis. Instead of circulating blood and breathing oxygen, plants circulate water and analogously "breathe" carbon dioxide and exhale oxygen. Therefore, animal breath connects inhaled oxygen back with the carbon atoms contained in the sun-built sugars we consumed when eating plants or animals. This circulation of oxygen empowers animals to efficiently convert the stored carbon-based energy into kinetic energy and other vital life processes through a process known as cellular respiration. In these regenerative cycles, the boundaries among organisms blur as the mutual dependencies define all aspects of autonomous life at the individual and community levels. If we consider life a shared foundational need among animals and plants, respiration is essential to that need. What more can we observe and learn from the cross-cultural resonance of these life-affirming human and non-human cultures?

One clear answer is their formal structure. Enabling this process is the specific form of the lungs that enfold in a set of self-similar formal structures that look like branches that start as a singular trunk (the trachea) before splitting into smaller and smaller components down to the tiny little alveolar sacs where fresh oxygen is exchanged for the carbon

dioxide waste product from the cellular respiration described earlier. This form repeats in the familiar form of the mature deciduous tree. The fractal unfolding of these self-similar forms maximizes the surface area for gas exchange, increasing the efficient conversion of solar energy to kinetic energy in living organisms. Furthermore, the branching geometry satisfies other needs – optimizing flow and distribution, minimizing energy expenditure, and providing resiliency and adaptability. Humans can live with one lung, just as a tree that loses a sizeable lateral branch may still thrive. In this way, the fractal form represents a cross-cultural synergistic satisfier among a broad spectrum of living organisms that rely on such respiratory cycles.

From a plane or aerial images, the Pittsburgh region or the Ohio River basin appears impossibly thick with ravines, valleys, and rivers. The elevation map of Pittsburgh above reveals echoes of the same fractal geometry of the lung or tree. Yet, this geographic form, tied to its geology and hydrology, does not partake in the same carbon-based life processes. Yet the river system strives to conserve energy like plants and animals do, and it satisfies that need through the same synergistic satisfier of the emergent fractal form. Across the entire system, the emergent geometry of the river system works to balance kinetic and potential energy as water molecules on the Earth's surface pursue the path of least resistance and erode and distribute sediments along the way. In other words, the expression of the energy distribution in the fractal form of the river system performs a similar life-giving function of similar forms in trees and lungs. The efficient fractal form represents a synergistic satisfier for human and non-human living organisms and inorganic and organic cultural expression.

Despite the inherent resilience of this form, the river system remains susceptible to weakening and collapse. Smoking cigarettes produces plaque buildup in the lungs, while asthma's inflammation restricts airways. Each inhibits the transfer of oxygen. Soot buildup on leaves like those from wildfire or volcanos choke leaves, rendering them incapable of photosynthesis. Similarly, drought causes insufficient water to interact with carbon dioxide in the leaf. When interventions disrupt the energy flows within the fractal geometry of river systems, we should expect analogous pathologies. The exploitation of both the material and formal qualities of the Ohio River basin represents such a disruptive intervention. The forced control of flows through dams and the straightening or ignoring of dynamic contours by rails and bridges may have reduced the time-to-market. However, it also mechanized and ossified the once regenerative and adaptable form of the system. This conversion of the river system from a cross-cultural synergistic satisfier to all to a singular satisfier of freedom to an elite, exploitative few. An extended rehearsal of the harmful social pathologies that follow the corruption of such a powerful synergistic satisfier is outside the scope of this reflection. However, suffice it to say these issues will have the qualities of "wicked problems" at the focal center of Transition Design discourses (Irwin, 2015). To take a projective posture for the remainder of this piece, I dwell on the potentials and not the pathologies by looking to lessons from human cultures that thrived within and shared more wholly in the synergies of the wide-ranging cultures in the Pittsburgh region.

Lessons in Alignment from Pre-Modern Human Cultures

As I learned in a local news article, late in the summer of 2023, a group of worried citizens led by Degawëno:da's on a kayak pilgrimage to an Adena burial mound site downriver of downtown. Often referred to as the "Moundbuilders," the nomadic, hunter-gatherer people of the Adena culture lived in the Ohio River basin beginning around 1,000 BCE. Many speculate that the Adena later merged into the Hopewell culture, which started at roughly 100 BCE and lasted until approximately 500 CE, representing nearly a millennium and a half of cultural flourishing in the region.

Degawëno:da's, a leader of the Seneca indigenous tribe, led a river-bound demonstration to the McKees Rocks burial mound, which, according to the plaque commemorating the site, is the largest Adena burial mound in Western Pennsylvania. The Seneca people were among the confederated nations of the Iroquois who played a prominent role in the early American history centered around Pittsburgh. They also consider the Adena to be the people of their ancestors. Tragically, there is no mound at the site, only the plaque and an active concrete manufacturer. In a telling turn of events, extractive industries heavily quarried the site, including the sacred burial mound. Degawëno:da's references Earth's animate quality and laments its degradation. He states: "I can feel the element of creation that is just crying for help. Nobody's listening. And this has been happening for such a long time" (Gazette 2.0, 2023).

I see the expression of the "element of creation" in the dynamic, emergent unfolding of self-similar spaces among the region's organic and inorganic cultures. I also find hope in this modern pilgrimage story. In the picture of the mayor of the local municipality and Degawëno:da's, I see the same potential expressed in the interactions orchestrated by Mr. Rogers in his neighborhood. I see the sedimentation of love and care, not only for other people but for the place, and the potential beginning of yet another resonant fractal form *(See Figure 6)*.

Figure 6.
"McKees Rocks Mayor David Flick hugs environmental activist Degawëno:da's in front of the plaque commemorating the Indigenous burial mound site in McKees Rocks." (Source: https://www.gazette20.com/post/summer-solstice-seneca-activist-s-kayak-journey-calls-attention-to-access-issues-to-repatriated (Gazette 2.0, 2023).

The Adena culture left hundreds of earthen mound constructions, some elaborate and figural, others simple and geometric, throughout the Ohio River basin. These robust archeological records paint a more detailed picture of how the Adena lifeways integrated into the formal qualities of the river systems they coexisted within. Artifacts that scatter the various mound sites reveal that the Adena people traveled widely with the river systems, participating in trade and collective rituals at places of prominence and confluence. These sites, however, were not sites of prolonged habitation. Smaller subsets of kin groups more likely moved into and among deep autonomous tributary spaces. The imagery of much of their art, which often conveys a complex unfolding of geometric forms and figures, echoes the elaborate and relational unfolding structure of the region's hydrology and fractal form. The people of the Adena culture actively and ceremonially reinforced the sedimentary regional culture through ritualized burial practices in which kin groups would coalesce to periodically bury prominent members of their autonomous and shared communities in the same sites over hundreds of years. Archeologists argue that the Adena negotiated shared meaning through their burial practices by electing limited individuals from a range of kin groups for burial (Henry & Barrier, 2016). The construction of shared meaning through this ritualized practice helped build consensus around shared memories, histories, and ambitions (Henry, 2017).

Groups elaborated and expanded mounds in successive burials through time, allowing participants to play a vital role in forming essential connections among themselves, their group, and the group of others. While we do not know the precise nature of the social relations that emerged, these relationships suggest similar part-to-whole relationships that Mr. Rogers' highlights in his expression of the individual within the neighborhood. Indeed, these highly sophisticated and culturally rich places represent synergistic satisfiers of every human need, from protection to freedom. This density of needs met through mound building through the negotiation of differences and the creation of shared meaning may have played a role in maintaining peace and prosperity among kin groups (Henry, 2017).

The sedimentation of the organic and inorganic material in the mounds and the potential cosmological connection such places may have made to ancestral spirits for the Adena people resonates with the similar processes that generated the abundance from which they flourished in the sedimentary river system. While modern industrial culture negated the deep regional culture, the Adena culture aligned with it, allowing both to flourish together. Tellingly, the Adena culture and its successor lasted over a millennium. Capitalism's modern mechanistic, industrial culture is scarcely over 250 years old. To be comparably as resilient to the Adena culture, it would have to take us into the 2700s. I am among those who fear the world may become nearly impossible to inhabit by the end of this century. We can do better.

Participating/Partying in the Neighborhood

What can we learn from the aligned, cross-cultural synergistic satisfier comparable to the Aden burial mounds or other resonant practices in our communities today? Mr. Rogers'

neighborhood is one of ninety in Pittsburgh. These neighborhoods express a distinct character that has evolved from the legacy of waves of European immigrants seeking industrial labor in the growing manufacturing hub. The city's geography meant that ethnic enclaves remained autonomous, staying within the confines of a particular tributary, hillside, or flat where they expressed their cultures. This autonomy meant that each community built amenities that served the unique needs of their specific locality. These represent the unique fingerprint of a system of need satisfiers that Max-Neef defines as culture.

While historic buildings and names cement this legacy, modern Pittsburgh hosts less than half the people it did even a half-century ago. Furthermore, segregation has contributed to inequity and uneven access to opportunities for residents. Despite their inequity, these neighborhoods each present autonomous opportunities for flourishing to emerge through uniquely resonant, place-based cultures. What practices might empower these neighborhoods to incrementally imagine and realize a resilient future for themselves where autonomy does not mean isolation? Could the context of the Mr. Rogers framing of the neighborhood-self be the initial condition from which new, emergent fractal forms might evolve? What simple repetitive actions might cyclically sediment both the material and the immaterial, the imaginary and the real, with methods that resonate with the region's deep historical cultures?

The City of Pittsburgh, like other cities, has an ordinance it is code that enables residents to exercise a unique right to suspend certain restrictions and promote alternative and emancipatory events that transgress the typical hierarchies and values that have become ossified in city form–the block party *(See Figure 7)*. With the successful informal petition and support of a plurality of neighbors and the submission of a small fee, neighbors in the city may close their streets to car traffic and host autonomous celebrations of local conviviality, shared connection, and meaning. With so many resonant qualities, such actions might generate resonance sedimentary systems in the city's otherwise top-down form.

The block party empowers neighbors to be better neighbors. Suppressing the car's speed and celebrating the slowness of a conversation, like the Adena mound, the block party requires negotiation, dissent, and compromise. It requires the neighborly ethic expressed in Mr. Rogers' Neighborhood, cultivating an environment where "feelings are mentionable and manageable," as Fred Rogers put it ("Extension of Authorizations Under the Public Broadcasting Act of 1967, Hearings before the Subcommittee on Communications of the Committee on Commerce, United States Senate, 91st Congress, April 30 and May 1, 1969 Note," 1969).

Figure 7.
Image taken by the author at a Pittsburgh block party that went late into the night. The food and company were delicious.

Like the unfolding and evolving structure of the river system, the wooden barricade deposited at the ends of streets redirects flows. It distributes kinetic energy in the form of non-vehicle-based transport more efficiently – reversing the mechanization of city streets for cars. From the pedestrian perspective, the city's surface area grows, and opportunities for encounters expand, like in the lung or leaf. Furthermore, the required consensus facilitates active dissent among neighbors with differing opinions while providing opportunities to form shared meaning, identity, and aspirations, like burial practices in the Adena culture. In its current form, the block party already represents a modern cross-cultural synergistic satisfier capable of evolving cultural resiliency at the local level. Yet that capacity could radically expand if the rights to such interventions also broaden.

The current ordinance allows for only one such event per year per residential block within the city. An incremental increase in the freedom to organize such interventions would represent an alignment of contemporary human culture with the deep geologic culture. A broader liberation of such rights could meaningfully alter the imaginary and real logic of the city and enable opportunities for neighborhoods to have increasing local autonomy while remaining connected to a collective identity, a connection to something bigger than oneself. The potential of these practices demands an Adena style persistence and Mr. Rogers' style ethic and invitation. *Won't you be my neighbor?*

The Neighborhood Beyond

The rivers, runs, hollows, and ravines share a resonant culture with breathing animals and plants. Among these cultures, the emergent resiliency of their branching, self-similar spaces represents a cross-cultural synergistic satisfier for a breath of human and non-human, organic and inorganic needs. The qualities of water that make it essential for life in organic bodies are the same qualities that make it so expressive in animating dynamic changes across vast times and great space. Water is unique among compounds in that it has strong cohesions, attraction to itself, and strong adhesion, attraction to others—cohesion gifts water with its characteristic ability to flow and maintain a coherent form. Mr. Rogers might characterize these properties as the ability to love oneself and to love others or that the water is worthy of loving and capable of loving others.

The flow of water and the flow of love each help express and evolve the emergent form through slow and methodical sedimentation. Identifying comparable activities that facilitate the emergence of fractal forms would be a valuable orientation for ecological literacy as it should strive to reveal such intrinsic connections and continuities. Designing and supporting such practices would guide future modes of human cultures in the region that align with the deep regional historic culture expressed in its geology and hydrology, and that will enable such cultures to endure far into the future. According to Max-Neef, "cultural change is, among other things, the consequence of dropping traditional satisfiers for the adoption of new or different ones" (Ekins *et al*., 1992). For human flourishing in the deep future, we should drop mechanistic singular satisfiers of modern industrial capitalism and evolve synergistic satisfiers that align human and non-human, organic and inorganic cultures. With increased ecological literacy emerging from the shared ethics of love and water, among other inspirations, we may find others in addition to emergent fractal forms. I imagine these discoveries would be vital to realizing place-based sustainable transitions in this region and any other that endeavored to discover such practices.

We made it! We are here--Pittsburgh, Pennsylvania, USA. Like here, actions taken today in places across the globe shape the contours of tomorrow. Pittsburgh's sustainable transition will not depend on building more bridges, steal or otherwise; it will depend on nurturing processes that deepen our shared connection to places and the broader array of cultures they host. In a quote published in his obituary in the Pittsburgh Post-Gazette, Mr. Rogers provides a clear theory of change. He offers: "The only thing that ever really changes the world is that somebody gets the idea that love can abound and can be shared." I am in. I suppose that with a postcard that included that quote with the extension "through a participatory, emergent fractal form," I might have encapsulated more succinctly much of what I covered in this more meandering approach. I accept, however, that this work can and must take time despite the urgency. The alignment of human culture with the deep geologic culture of a place I advocate for here requires more than a post car. This align-

ment requires persistent local action within resonant cultures of care. I hope the approach I explored here may be valuable to you and your neighborhood and that you might send a postcard of your own.

With love,
WH Martin
January 2024
Pittsburgh, Pennsylvania, USA

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Resumen: En el ensayo exploro el potencial regenerativo de Pittsburgh, Pensilvania, a través de una lente histórica profunda, abogando por un modo de alfabetización ecológica que rompa la distinción entre persona y lugar. Hago hincapié en la importancia de descubrir y elaborar acciones que resuenen entre la identidad cultural geológica y humana como algo vital en la búsqueda de transiciones sostenibles. Contrasto las culturas premodernas de Pittsburgh con su pasado industrial más reciente, con el fin de destacar la sabiduría inherente al creador de programas infantiles de Pittsburgh, el Sr. Rogers, de la ética del amor al vecindario para potenciar dichos procesos.
Utilizando un enfoque autoetnográfico, mezclo narraciones personales con diversas fuentes, incluidas referencias históricas, científicas y culturales. Propongo un modelo de transición sostenible basado en el lugar y participativo que amplía el marco analítico de desarrollo centrado en el ser humano de Manfred Max-Neef para incluir necesidades no humanas, como los procesos geológicos. Inspirándose en formas geológicas, biológicas y culturales humanas que expresan relaciones ramificadas, complejas pero autosemejantes de parte a parte, como el sistema fluvial, el pulmón, el árbol y las prácticas funerarias, este enfoque se centra en el desarrollo de acciones que satisfagan sinérgicamente las necesidades dentro y entre diversas culturas, tanto humanas como no humanas, a través de procesos emergentes y sedimentarios y formas fractales.
Presento Pittsburgh como paradigma para las ciudades que afrontan los retos del desarrollo moderno, ofreciendo una metodología situada y basada en el lugar para construir comunidades resilientes y regenerativas e inspirar futuros urbanos similares sostenibles.

Palabras clave: Diseño participativo - Creación de lugares - Resiliencia urbana - Alfabetización ecológica - Morfología urbana - Ecología social - Emergencia - Prácticas indígenas - Intervenciones de diseño - Diseño de transición.

Resumo: Neste ensaio, exploro o potencial regenerativo de Pittsburgh, Pensilvânia, por meio de uma lente histórica profunda, defendendo um modo de alfabetização ecológica que rompe a distinção entre pessoa e lugar. Enfatizo a importância de descobrir e elaborar ações que ressoem entre a identidade geológica e a identidade cultural humana como vitais na busca de transições sustentáveis. Contrastei as culturas pré-modernas de Pittsburgh com seu passado industrial mais recente, a fim de destacar a sabedoria inerente do criador de programas infantis de Pittsburgh, o Sr. Rogers, com sua ética de amor baseado na vizinhança, para fortalecer esses processos.
Utilizando uma abordagem autoetnográfica, mesclo narrativas pessoais com diversas fontes, incluindo referências históricas, científicas e culturais. Proponho um modelo de transição sustentável participativa e baseada no local que expande a estrutura de desenvolvimento analítico e centrado no ser humano de Manfred Max-Neef para incluir neces-

sidades não humanas, como processos geológicos. Inspirando-se em formas geológicas, biológicas e culturais humanas que expressam relações ramificadas, complexas, porém autossimilares, de parte a todo, como o sistema fluvial, o pulmão, a árvore e as práticas de sepultamento, essa abordagem se concentra no desenvolvimento de ações que satisfaçam sinergicamente as necessidades dentro e entre diversas culturas, tanto humanas quanto não humanas, por meio de processos emergentes, sedimentares e formas fractais.
Apresento Pittsburgh como um paradigma para as cidades que enfrentam os desafios do desenvolvimento moderno, oferecendo uma metodologia situada e baseada no local para a construção de comunidades resilientes e regenerativas e inspirando futuros urbanos sustentáveis semelhantes.

Palavras-chave: Design participativo - Criação de lugares - Resiliência urbana - Alfabetização ecológica - Morfologia urbana - Ecologia social - Emergência - Práticas indígenas - Intervenções de design - Design de transição