

Urban Greenspace and Economic Health in Cities: A Comparative Case Study of Pittsburgh and Philadelphia, Pennsylvania

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This paper examines the potential links between urban greenspace and economic health. The scope of urban greenspace includes parks, canopy coverage, and number of trees. This paper evaluates economic health through statistical indicators such as unemployment, median household income, population levels, and gross domestic product (GDP), and provides relevant historical and political context to establish the basis for more comprehensive analysis. Confounding variables are minimized by limiting the comparison to two cities in Pennsylvania: Philadelphia and Pittsburgh.

Key concepts and terms

Urban greenspace is comprised of three primary elements: *canopy coverage*, *estimated number of trees*, and *park space*. *Canopy coverage* is defined as the amount of land area that is occupied and covered by trees. This will be quantified through the amount of land acreage covered by trees, and as a ratio of tree coverage to total city area. O’Neil-Dunne (2011) and Tree Pittsburgh (2012) both use data gathered from satellite imagery to determine the amount of tree canopy cover, based on guidelines provided by the United States Department of Agriculture (USDA) Forest Service. Cataloguing individual tree specimens occurs through initiatives sponsored by the government and non-profit organizations. In the case of Philadelphia, data collection for the individual cataloguing of trees is conducted through “PhillyTreeMap” (2016), an online crowd-sourced mapping platform.

The final pillar of the urban greenspace definition is *park space*, which provides a wide array of civic and environmental services to communities. Young (1995) argues that “through the presence of parks, . . . society . . . become[s]

healthier, wealthier, more crime-free, and more democratic” (p. 537). Park advocates promote access to these kinds of civic spaces because they help to enhance both social cohesion and public health. These areas are crucial to include within the defined scope of urban greenspace, because they are essential to the conservation of urban forests and green infrastructure systems (Nowak et al., 2010). Sarr & Puettmann (2008) further describe how parks provide invaluable ecological support for urban forests. Even though the definition of urban forests extends to include all public and private trees, park spaces may be uniquely poised to encourage the cultivation of sustainable, biodiverse spaces that might otherwise be absent from urban locales.

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This report assesses each city’s economic health using four indicators: population levels, median household income, unemployment rate, and gross domestic product (GDP). Data were also collected on individual income, housing, and education, but the timeframes were not defined clearly enough to allow for a proper comparison. City economic health was assessed based upon data acquired from the U.S. Census Bureau (population and demographic information), U.S. Department of Labor Bureau of Labor Statistics (unemployment and jobs statistics), and the U.S. Department of Commerce Bureau of Economic Analysis (fiscal and economic data).

The 2010 and 2015 GDP data for Philadelphia also includes the cities of Camden, New Jersey and Wilmington, Delaware, and therefore are not accorded the same weight as the other factors being considered. When possible, equivalent information was collected from the same sources on the state of Pennsylvania, to serve as a benchmark. This is to ensure a more complete understanding of any regional influences that may be affecting the two cities under comparison.

Research Statement

Trees and parks are known to be beneficial to cities in numerous ways, but this paper explores whether there are any relationships between urban greenspace and a city’s economic health. For urban residents, businesses, and governments, the value of trees and greenspace has become a frequent topic of discussion, from both an environmental and social perspective. Integrating trees and expanding urban forests has proven to be a vital part of maintaining the natural balance of a city’s ecosystem. Trees deliver a multitude of environmental and social benefits for individuals and communities. Urban forests, as described by Nowak et al. (2010), refer to “all publicly and privately owned trees within an urban area – including individual trees along streets and in backyards, as well as stands of remnant forests” (p. 3). As a system, Nowak et al. (2010) further argue that urban forests help to:

- improve air quality and local climate
- lower ambient air temperatures and overall energy use
- offset building emissions
- positively affect climate change by directly storing carbon within their tissues
- enhance water and soil quality
- mitigate storm-water and runoff pollution
- provide noise reduction benefits
- provide wildlife and biodiversity support
- increase real estate and commercial property values through landscaping
- positively impact public health, at both the community and individual level (p. 6-7).

To control for confounding variables, the central discussion is based on a comparison of two Pennsylvania cities: Philadelphia and Pittsburgh. These specific cities were selected because they are in the same state, have deep roots in American history, and have experienced similar industrial trends. The comparative analysis and conclusion focuses on three categories: city history and philosophy, parks, and economic health. Due to the documented evidence of the positive functions of trees, it can be theorized that the prevalence of city parks, greenspace, and urban tree coverage has a positive relationship with the economic health and resilience of a city.

Profile of Philadelphia, Pennsylvania: “The City of Brotherly Love”

Brief history

Philadelphia was planned with civic and open space preservation as a central tenet of the city’s design. As envisioned by botanist William Penn and Chief Surveyor Thomas Holme in 1683, Philadelphia was designed with public space and urban form as focal points (“Department of

recreation history”, n.d.; Lewis, 2006). Due to its proximity to waterways and rail systems, Philadelphia became a primary port city in the 18th and 19th centuries. It was in this same period that the state of Pennsylvania passed the Consolidation Act of 1854, which enabled Philadelphia City and County to annex surrounding areas for utilization as open public space. Philadelphia’s city council undertook its first major endeavor following the new law in 1855. Designed by J.C. Sidney, Fairmount Park was modeled after New York City’s Central Park and established itself as one of America’s earliest civic spaces (“Fairmount park origins”, n.d.). However, subsequent industrialization shifted the city’s primary focus towards economic growth and development and away from open space preservation.

Under the ratification of the 1919 Charter, municipal recreation became a function of the city’s Department of Public Welfare. In 1952, a new city charter was adopted, which initiated the election of Philadelphia’s first mayor and the creation of the Department of Recreation. Recreational services were not given significant administrative support or funding during this time period, which resulted in poorly maintained public spaces through the second half of the 20th century. But eventual public outcry led the city to carry out revitalization efforts in the 1990s and early 2000s. One such movement inspired the creation of the Parks Revitalization Project in 1993 by the Department of Recreation. Most recently, the Philadelphia City Council adopted a new comprehensive plan in 2011 entitled *Philadelphia2035*. The first phase details the city’s policy priorities and goals, with natural resource management, community development, and historic preservation at the apex of the plan’s vision. Open space preservation, environmental resource management, and community building were all specifically prioritized in the Philadelphia Comprehensive Plan (City of Philadelphia, 2011).

Urban greenspace

Improving urban greenspace is currently a major priority for Philadelphia (City of Philadelphia, 2011). Parks have always been a central feature of Philadelphia, and their continued maintenance and improvement is vital to the health and happiness of the community (Richardson et al., 2012). Figure 1 shows that there are 69 parks in Philadelphia, spanning a cumulative area of almost 17 square miles and occupying nearly 13 percent of the city’s land (TPL, 2015). The city plans to expand this percentage through the development of a citywide system of trails that connects neighborhoods, parks, and waterfronts. For such a system to be successful, it must also preserve existing natural features.

Nature, Parks and Gardens

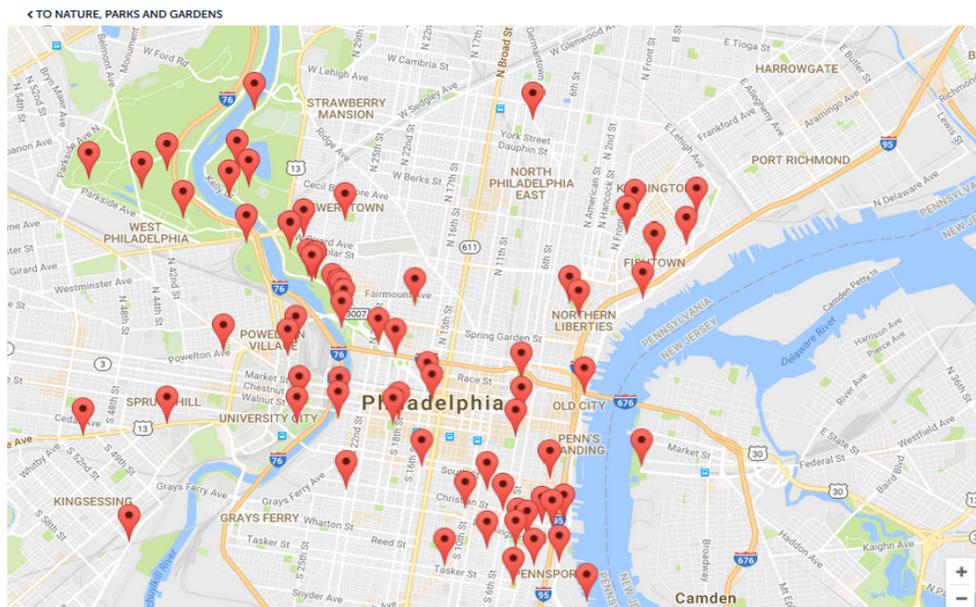


Figure 1. Philadelphia nature areas, parks, and gardens

Source: “Nature, parks, and gardens”, 2016

O’Neil-Dunne (2011) estimates that Philadelphia has approximately 26 square miles of urban canopy coverage, representing 20 percent of the total land area in the city (U.S. Census Bureau, 2010). Current estimates from OpenTreeMap, a crowd-funded effort, place the city’s tree count at around 58,000 (“PhillyTreeMap”, 2016).

Philadelphia2035 aims to increase tree canopy coverage to 30 percent of the city’s land area over the duration of the plan, by encouraging more private and public ownership of trees and expanding the stock of the urban forest. It aims to do this by promoting infill development, a process that reduces the prevalence of vacant lots while incorporating additional greenspace. The plan further describes the creation of a network of “green streets” that integrate trees and other vegetation to reduce ambient temperatures and improve air quality and storm water irrigation (City of Philadelphia, 2011; McDonald et al., 2016).

City Economic Health

From 2010 to 2015, the population of Philadelphia grew by 2.7 percent, to over 1.56 million residents and 580,000 households (U.S. Census Bureau, 2016). During the same time period, 26.4 percent of the city’s residents fell below the federal poverty line. The median household income in Philadelphia during this timeframe was just over \$38,000 per year in 2015 dollars, while annual per capita income was approximately \$23,000. (U.S. Census Bureau, 2016). From 2010 to 2015, the GDP of the Philadelphia metropolitan area¹ grew from \$348.7 billion to \$411.1 billion (USBEA, 2016a). Among other factors, (see Appendix Figure 8) positive GDP and population growth indicate that an economy is both strong and stable.

Unemployment and job industries are also important considerations when evaluating the economic health of a community. Unemployment describes the percentage of the labor force that is currently out of work but still actively searching for a new job. As of October 2016, Philadelphia’s

¹ GDP calculations for the Philadelphia metropolitan area also include figures from Camden, NJ and Wilmington, DE.

unemployment rate was seven percent. Unemployment in the city fluctuated between 9.6 and 11.8 percent from May 2009 to October 2013². Figure 2 shows that, post-Recession, the unemployment rate has only consistently been under eight percent since September 2014.

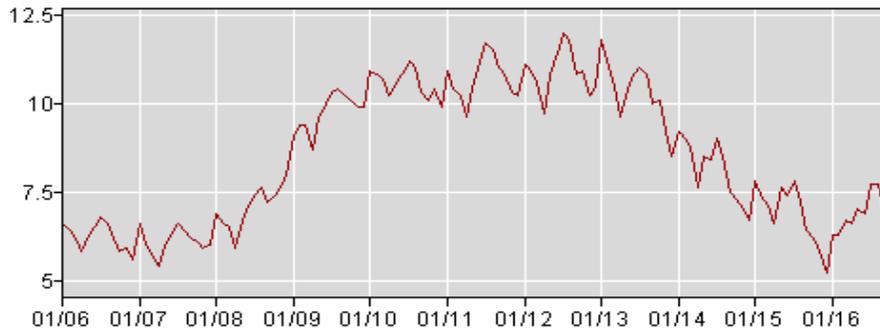


Figure 2. Philadelphia unemployment rate, January 2006 - January 2016

Source: USBLSb, 2016.

Philadelphia is home to three major research universities and several pharmaceutical and biotechnology facilities. Tourism is another important driver of the city’s economy, and the number of tourists has increased by record-breaking numbers in recent years. The city saw 41 million visitors in 2015, up from 39 million in 2014 (Murrell, 2016). For further information on Philadelphia’s employment industry ratios and industry job change data from the last 12 months, see the Appendix for Figures 3 and 6.

Profile of Pittsburgh, Pennsylvania: “The Steel City”

Brief history

Pittsburgh was founded as a frontier village in the early 1700s. The city’s proximal and abundant natural resources, such as waterways, coal, iron, natural gas, timber, limestone, created a geographic advantage. The area became an industrial hub for logging, coal mining, and steel production through the 18th & 19th centuries. Pittsburgh was one of the first urban, industrial powerhouses in the United States, and it maintained that position into the mid-1900s. The Pittsburgh Study, conducted 1907-1914, investigated the effects of this industrial environment on residents, and concluded that “life in the city was aggressive, individualistic, and untamed. But it was also careless, wasteful, and lacking in the civic pride necessary to prevent environmental destruction and human degradation” (Penna, 1976). Most of the city’s first planning efforts were concentrated in the realms of economic and business development. Efforts to improve the community were driven by the private sector through the investments of wealthy businessmen, as the city government was largely resistant to requests from the community to expand public services such as parks and playgrounds.

The Pittsburgh Forward campaign of 1926-1927 advocated for greater civic awareness and engagement, as well as the improvement and expansion of public spaces such as parks, playgrounds, waterways. Throughout the 1940s and 1950s, environmental and economic reforms led to the rebranding of Pittsburgh as a “Renaissance City” (“Pittsburgh history”, 2016; “Parks”, 2016). The decline of heavy industry, in combination with people seeking more open space, better housing, and improved educational facilities, caused a mass migration to suburbs. This resulted in an almost 14

² Note that the Great Recession occurred from 2007 to 2011, which caused unemployment rates to increase nationwide.

percent population decrease from 1960-1970 (“Pittsburgh history”, 2016). It was not until the mid-1990s that a coalition of private citizens established a contractual agreement with the city to restore four of the city’s parks through the Pittsburgh Parks Conservancy. Founded by citizens in 1996, the Pittsburgh Parks Conservancy works with the City of Pittsburgh under a contracted public-private agreement (“About us”, 2016).

Open Space Pittsburgh (or *OpenSpacePGH*) was adopted by city council in 2013 as a component of the city’s Comprehensive Plan. It was the first formal document to guide the use of green and recreation spaces in the city (Pittsburgh City Planning, 2013). Historically, government involvement in parks or greenspaces had been limited, but the adoption of *OpenSpacePGH* marked a new era for public space planning in Pittsburgh. It provides an assessment of the past and current state of services being delivered by the city, and a general outline of the policies that will be implemented to improve the quality of greenspaces, parks, and other recreation facilities in the city. The Master Tree Plan that was adopted in 2012 was a private-public collaboration, and is being funded through a combination of grants and private fundraising.

Urban greenspace

Industrial production used to be a focal element of the Pittsburgh economy, and it dramatically shaped the surrounding landscape. Hill erosion caused by excessive logging and illegal dumping resulted in landslides and other environmental hazards. After the decline of industrial production in the city in the 1950s, trees gained a renewed ability to grow on the hillsides surrounding the city (City of Pittsburgh, 2015). As of 2011, trees occupy 42 percent of the city’s total land cover, and the number of individual trees is estimated to be around 2,628,000. The city’s canopy coverage area spans 14,883 acres, or 23.3 sq. miles, (Tree Pittsburgh, 2012), but most trees are at the edge of the city rather than downtown.

Until the Pittsburgh Parks Conservancy was founded, urban greenspace received little direct support from the municipal government. But today, the city has five officially designated parks, and there are nine county parks local to the city. Additionally, there are several waterfront park systems that are semi-publicly and privately owned. These areas feature previously abandoned industrial spaces that have been transformed into greenways, trails, and other examples of green design.

OpenSpacePGH focuses on the city’s ongoing strategy to promote better city, regional, community, neighborhood, and riverfront parks. These improvements will largely focus on enhancing natural spaces in parks, beautification sites, and greenways. The city also plans to build connected trail-systems that simultaneously support foot and bike traffic (City of Pittsburgh, 2015). The city has a separate master plan for urban forestry, which was adopted in 2012. The plan’s primary goal is to have Pittsburgh’s total canopy coverage exceed 60 percent within the next 20 years. This vision will be pursued through citizen engagement, while implementation and funding will be directed through interagency agreements between public and private officials (Tree Pittsburgh, 2012).

City Economic Health

Economic indicators suggest that Pittsburgh’s economy is strong, but not growing significantly (see Appendix Figure 8). Population levels flattened in the 1960s and 1970s, and have since remained relatively steady at around 300,000 residents, with a slight decrease in the population between 2010 and 2015. The city has an estimated 132,468 households, with 22.9 percent of individuals falling below the federal poverty line. The median household income in Pittsburgh is \$40,715, and the income per capita between 2011 and 2015 was \$28,097 in 2015 dollars (U.S. Census Bureau, 2016). Pittsburgh’s GDP grew by nearly 18 percent from 2010 to 2015, from approximately \$117,895 to \$138,873 (USBEA, 2015a). Together, these factors demonstrate sustained growth in Pittsburgh’s economy.

Pittsburgh has long placed great cultural value on the idea of being a contributing member of the labor force. The unemployment rate in the city is currently low, measuring at 5.5 percent in October 2016 (USBEA, 2016c). The last ten years have proven to be relatively stable for Pittsburgh, even during the worst parts of the financial crisis. Unlike the majority of the country, Pittsburgh's unemployment rate never exceeded ten percent (see Figure 4). The city's peak unemployment rate of 9.5 percent was reached in February 2010, though it remained between 6.8 and 8.2 percent from April 2010 to March 2013. The rate continued to slide down, but has remained between 4.7 and 6.6 percent since September 2013 (USBEA, 2016c). Current employment industries are largely in biomedical and technical sciences (see Appendix Figures 5 & 6), since there is a strong network of teaching hospitals and a high concentration of universities in the city.

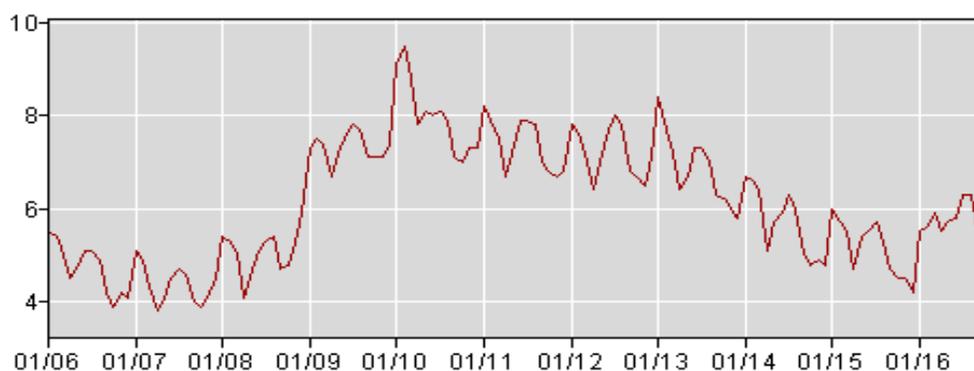


Figure 4. Pittsburgh unemployment rate, January 2006 - January 2016

Source: UCBLs, 2016c.

Comparative analysis

Historical & philosophical differences

Pittsburgh and Philadelphia have historically shown vastly different philosophies in how they prioritize public greenspaces in city planning. Philadelphia's designers were concerned with creating numerous open civic spaces, whereas Pittsburgh's city council tended to rank demands of business and industry above those concerning open civic spaces. Park space and the urban environment were under the management of the city government in Philadelphia, while most parks in Pittsburgh were privately maintained or neglected by the public. Both cities, however, struggled with maintaining their public facilities through the second half of the 20th century.

Despite dramatic differences in perspective and philosophy, both cities have shown a renewed focus on preserving urban greenspace and parks and planning more cohesive communities in the past five years. Both cities have released comprehensive plans since 2011. Pittsburgh's plan has a 20-year scope and is divided into three sections: Urban Forestry (2012), Historic Preservation (2012), and Open Space Conservation (2013). Philadelphia's first component of the plan has been released, *Philadelphia2035*, which is the vision for the city. The second iteration of the Philadelphia Comprehensive Plan involves cultivating the 17 individual district and neighborhood plans to address the needs of specific subgroups and areas. Both plans outline specific policies for implementation with overarching intentions to foster and nurture urban greenspaces for a healthier and more unified community.

Canopy coverage & parks

	Philadelphia	Pittsburgh	Pennsylvania
Land area (sq miles, 2010)	134.10	55.37	44,742.70
Total Parks & Recreation Budget, FY2016	\$57,711,833	\$5,008,950	\$92,333,000
Approximated spending on parks and recreation, per resident	\$66	\$54	\$7
Number of Parks	69	18	N/A
Acreage of Parks within City	10,815	2,983	N/A
Parkland as a percent of total city area	13%	8.5%	N/A
Number of trees (est. 2011)	58,100	2,828,000	N/A
Urban canopy coverage area (sq. miles, 2011)	26.4	23.3	N/A
Tree canopy as a percent of land area	20%	42%	N/A

Figure 7. Urban Greenspace Data

Sources: City of Philadelphia, 2015; City of Pittsburgh, 2015; Nowak et al., 2012; O’Neil-Dunne, 2011; “PhillyTreeMap”, 2016; Pittsburgh City Planning, 2013; TPL, 2015; U.S. Census Bureau, 2016.

Figure 7 illustrates the differences between various greenspace indicators in Philadelphia, Pittsburgh, and Pennsylvania. With its 69 parks and gardens, Philadelphia has a higher ratio of park land to total city acreage than Pittsburgh, although Pittsburgh has 41 percent less land area than Philadelphia. Although Philadelphia has more park space, Pittsburgh’s percentage of tree canopy coverage is more than twice that of Philadelphia’s.

In its original planning efforts, Philadelphia has strategically located and cultivated greenspaces and the urban forest. By comparison, Pittsburgh’s urban forest and greenspace planning initially grew from unintentionally-formed roots. Both modern plans are characterized by the similar traits and goals of expanding the network of trails, preserving open space, conserving natural resources and watersheds, redeveloping abandoned industrial areas into greenways, and investing in community spaces such as parks and recreation facilities. Both cities also intend to increase their urban canopy coverage by ten to twenty percent within the next twenty years.

Economic impact

	Philadelphia	Pittsburgh	Pennsylvania
GDP (2010) (in thousands)	\$348,749	\$117,895	\$569,697
GDP (2015) (in thousands)	\$411,161	\$138,873	\$709,762
Change in GDP 2010-2015	+17.89%	+17.79%	+24.59%
Unemployment rate (10/2016)	7.0%	5.5%	5.8%
Total Number of Nonfarm Employees	712,700	1,179,700	5,895,300
Total Operating Budget, FY2016	\$3,895,000,000	\$518,407,665	\$8,620,000,000

Figure 8. Economic comparison of Philadelphia and Pittsburgh between 2010 and 2015

Sources: City of Philadelphia, 2015; City of Pittsburgh, 2015; USBEA, 2011; USBEA, 2016a; USBEA, 2016b; USBEA, 2016c; U.S. Census Bureau, 2016.

Figure 8 demonstrates the variances between the economic benchmarks under consideration. The four primary indicators used to create the economic health profile of each city were GDP, income, unemployment, and population (see Appendix Figure 8). Pennsylvania data were used as a benchmark for another point of comparison between the two cities. The overall economic trajectory for both cities seems to be positive, although Pittsburgh is more stagnant whereas Philadelphia is seeing increases in both GDP and population. Pittsburgh's population has not changed dramatically since the decline of steel manufacturing, but Philadelphia is continuing to promote itself as a hub of culture and entertainment. Jobs are growing in multiple industries across Philadelphia (see Appendix Figure 6), though it is important to note that the labor pool is significantly smaller compared to Pittsburgh. Since GDP is defined in regional terms, it is difficult to use as a direct metric of comparison to Pittsburgh.

Pittsburgh's unemployment and income levels are generally better than Philadelphia's, as the Western Pennsylvanian city has a lower unemployment rate and higher median household and per capita incomes. Higher income levels in Pittsburgh may be attributable to higher high school and post-secondary degree attainment rates compared to Philadelphia. Median value of homes, median gross rent prices, population density, and poverty levels are all relatively higher in Philadelphia, as are rate of home ownership.

Historically, Pittsburgh has focused more on managing its economic growth, while Philadelphia cultivated parks and civic spaces. Interestingly, the trajectory of the Pittsburgh economy plateaued and stabilized in the mid-20th century, and it has a higher density of urban canopy coverage, even though Philadelphia has more parkland and urban greenspace. In contrast, Philadelphia's growth has been fluctuating, and even with generally positive trends, this inconsistency makes it difficult for planners to anticipate and properly prepare for the future needs of the city's residents.

Conclusion

The analyses in this paper could be enhanced through additional research that accounts for confounding variables. There may be a link between the amount of greenspace and economic health of a city, but the extent of this influence is still questionable when only using GDP, unemployment, population, and per capita income as points of comparison. If the definition of urban greenspace and the economic health indicators were further operationalized and quantified, the results may offer a more complete picture of the city's socio-environmental ecosystem.

The investigation of historical policies can provide keen insight into a city's management of urban greenspaces. One method to improve the validity of the paper would be to look at a wider time frame with more than just two data points. This would provide greater insight into how greenspaces and land use have changed over time. The historical information in this report lacked reliable long-term data on the extent of urban greenspace and parks.

External factors beyond greenspace may also influence a city's economic health. For example, Philadelphia's growth may not be attributable to its parks, but rather to its renewed promotion as a destination for tourism. The findings in this paper hint at a positive relationship between urban greenspace and a city's economic health, but reaching a definitive conclusion requires further research and more extensive data.

References

- "About us". (2016). *Pittsburgh Parks Conservancy*. Retrieved from <http://www.pittsburghparks.org/the-conservancy>
- City of Philadelphia. (2011). *Philadelphia 2035: Citywide vision*. Philadelphia, PA: Author.
- City of Philadelphia. (2015). *The Mayor's operating budget in brief for fiscal year 2016*. Philadelphia, PA:

- Author.
- City of Pittsburgh. (2015). *2016 operating budget*. Pittsburgh, PA: Author.
- “Department of recreation history”. (n.d.). *City of Philadelphia Parks & Recreation*. Retrieved from www.phila.gov/ParksandRecreation/history/departmenthistory/Pages/RecreationDepartmentHistory.aspx
- “Fairmount park origins.” (n.d.). *City of Philadelphia Parks & Recreation*. Retrieved from www.phila.gov/ParksandRecreation/history/departmenthistory/parksystemhistory/Pages/FairmountParkOrigins.aspx
- Kardan, O., Gozdyra, P., Misic, B., Moola, F., Palmer, L., Paus, T., & Berman, M. (2015). Neighborhood greenspace and health in a large urban center. *Scientific Reports*, 5(11610), 1 - 14.
- Lewis, M. (2006). The first design for Fairmount Park. *The Pennsylvania Magazine of History and Biography*, CXXX, (3), 283 - 297.
- McDonald, R., Kroeger, T., Boucher, T., Longzhu, W., & Salem, R. (2016). *Planting healthy air*. Arlington, VA: The Nature Conservancy.
- Murrell, D. (2016, June 15). The most people ever visited Philadelphia in 2015. *Phillymag*. Retrieved from www.phillymag.com/business/2016/06/15/philadelphia-tourism-statistics-break-record/
- “Nature, parks, and gardens”. (2016). *Visit Philadelphia*. Retrieved from www.visitphilly.com/maps/category/nature-parks-and-gardens/86/202/#sm.0000kyh6eth1idbtzmy1clrqb5gl
- Nowak, D., Stein, S., Randler, P., Greenfield, E., Comas, S., Carr, M., & Alig, R. (2010). *Sustaining America's urban trees and forests*. Washington, D.C.: United States Department of Agriculture Forest Service.
- O'Neil-Dunne, J. (2011). *A report on the city of Philadelphia's existing and possible tree canopy*. Burlington, VT: University of Vermont Spatial Analysis Laboratory.
- “Parks”. (2016). *Greater Pittsburgh Convention & Visitors Bureau*. Retrieved from www.visitpittsburgh.com/things-to-do/outdoor-adventure/parks/
- Penna, A. (1976). Changing images of twentieth-century Pittsburgh. *Pennsylvania history: A Journal of Mid-Atlantic Studies*, 43, 48 - 63.
- “Philadelphia, PA”. (2016) *Forbes*. Retrieved from www.forbes.com/places/pa/philadelphia/
- “PhillyTreeMap”. (2016). *OpenTreeMap*. Retrieved from www.opentreemap.org/phillytreemap/map/
- “Pittsburgh, PA”. (2016). *Forbes*. Retrieved from www.forbes.com/places/pa/pittsburgh/
- Pittsburgh City Planning. (2013). *OpenSpacePGH: Optimizing Pittsburgh's open space, parks, and recreation system*. Pittsburgh, PA: Author.
- “Pittsburgh history”. (2016). *Greater Pittsburgh Convention & Visitors Bureau*. Retrieved from www.visitpittsburgh.com/about-pittsburgh/history/
- Porter, D. (2008). *Managing growth in America's cities*. Washington, D.C.: Island Press.
- Richardson, E., Mitchell, R., Hartig, T., de Vries, S., Astell-Burt, T., & Frumkin, H. (2012). Green cities and health: A question of scale? *Journal of Epidemiology and Community Health*, 66(2), 160 - 165.
- Sarr, D. & Puettmann, K. (2008). Forest management, restoration, and designer ecosystems: Integrating strategies for a crowded planet. *Écoscience*, 15(1), 17 - 26.
- The Trust for Public Land (TPL). (2015). *City Park Facts*. San Francisco, CA: Author.
- Tree Pittsburgh. (2012). *Pittsburgh urban forest master plan: A road map for the effective management of our urban forest*. Pittsburgh, PA: Author.
- U.S. Census Bureau. (2016). Quick facts: Pennsylvania, city of Philadelphia, city of Pittsburgh. Retrieved from

- www.census.gov/quickfacts/table/PST045215/4261000,4260000,42
- U.S. Department of Commerce Bureau of Economic Analysis (USBEA). (2011). Gross domestic product by state: Advance statistics for 2010 and revised statistics for 2007 - 2009. Retrieved from www.bea.gov/scb/pdf/2011/07%20July/0711_gdp-state.pdf
- U.S. Department of Commerce Bureau of Economic Analysis (USBEA). (2016a). Gross domestic product by metropolitan area, 2015. Retrieved from www.bea.gov/newsreleases/regional/gdp_metro/2016/pdf/gdp_metro0916.pdf
- U.S. Department of Commerce Bureau of Economic Analysis (USBEA). (2016b). Gross domestic product by state: Second quarter 2016. Retrieved from www.bea.gov/newsreleases/regional/gdp_state/2016/pdf/qgsp1216.pdf
- U.S. Department of Labor Bureau of Labor Statistics (USBLS). (2016a). Economy at a glance: Pennsylvania. Retrieved from www.bls.gov/regions/mid-atlantic/pennsylvania.htm#eag
- U.S. Department of Labor Bureau of Labor Statistics (USBLS). (2016b). Economy at a glance: Philadelphia City/County, PA. Retrieved from www.bls.gov/eag/eag.pa_philadelphia_co.htm
- U.S. Department of Labor Bureau of Labor Statistics (USBLS). (2016c). Economy at a glance: Pittsburgh, PA. Retrieved from www.bls.gov/eag/eag.pa_pittsburgh_msa.htm
- Young, T. (1995). Modern urban parks. *Geographical Review*, 85(4), 535 - 551.

Appendix

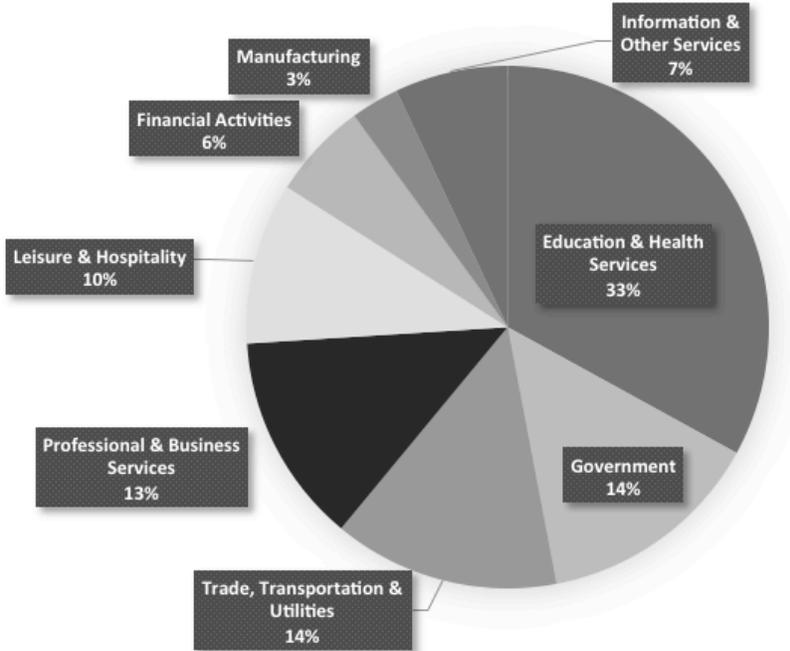


Figure 3. Nonfarm employment ratios in Philadelphia, PA as of November 2016. Total nonfarm employment workforce = 712,700 people

Source: USBLS, 2016b

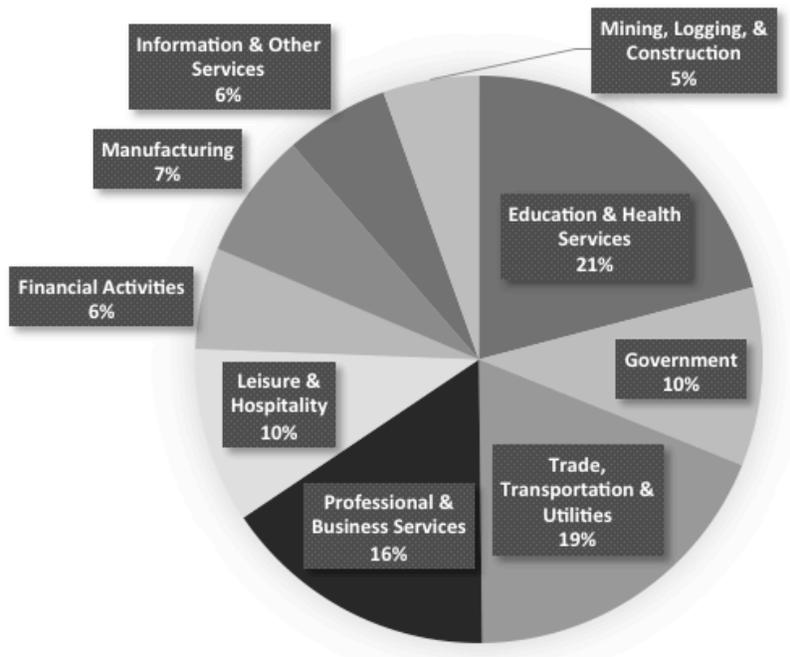


Figure 5. Nonfarm employment ratios in Pittsburgh, PA as of November. Total nonfarm employment workforce = 1,179,700 people

Source: UCBSL, 2016c

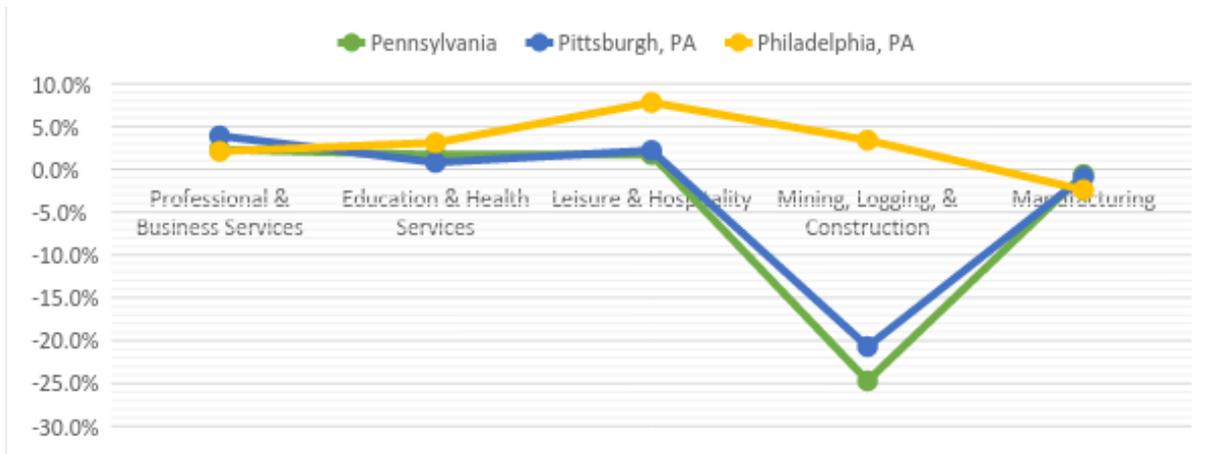


Figure 6. Percent change in number of jobs, per industry: Philadelphia, & Pittsburgh, PA – November 2015-November 2016

Source: USBLS, 2016b

	Philadelphia	Pittsburgh	Pennsylvania
Population (2010)	1,526,006	305,704	12,702,379
Population (estimated – 07/2015)	1,567,442	304,391	12,802,503
% change in population (2010-2015)	2.7%	-0.4%	0.8%
Percentage of PA’s total population	12.0%	2.4%	n/a
Density (population/sq mi, 2010)	11,379.50	5,521.40	283.90
Number of Households (2011-2015)	581,050	132,468	4,958,959
Median household income 2011-2015, in 2015 dollars	\$38,253.00	\$40,715.00	\$53,599.00
Per capita income 2011-2015, in 2015 dollars	\$22,919.00	\$28,097.00	\$29,291.00
Persons in poverty (2011-2015)	26.4%	22.9%	13.2%
High school graduate or higher (persons aged 25 & older)	82.0%	91.4%	89.2%
Bachelor’s degree or higher (persons aged 25 & older)	25.4%	38.3%	28.6%
Owner-occupied housing rate (ratio of how many people own their homes, instead of renting)	52.6%	48.0%	69.2%
Median value of owner-occupied housing units	\$145,300.00	\$94,700.00	\$166,000.00
Median gross rent (per month)	\$922.00	\$810.00	\$840.00

Figure 8. Population and economic health data table

Source: US Census Bureau, 2016