SUPPLEMENT: ADDITIONAL RESEARCH STUDIES ON URBAN GREENING

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What does the research tell us about urban greening practices, programs and policies?

Most of the existing urban greening research can be classified according to the type of urban greening strategy, the benefit(s) it can or has provided, and the methods that researchers use to assess or document those benefits. Successful greening projects, whether temporary or permanent in nature, can return underutilized land back into productive use and reduce or eliminate many undesirable externalities (e.g., crime, trash, junk, rodents, dangerous buildings, etc.) often associated with abundance of vacant lots and contribute to neighborhood revitalization.

Approaches and Applied Research Methods Some researchers examine a particular program in a particular city or neighborhood and document the benefits from the particular treatments using a variety of research methods, such as econometric analysis and gathering environmental data from a sample of individual sites or projects. Existing urban greening research, often case studies, offers us a snapshot in time and typically do not examine the impacts and influence of deploying one or more urban greening strategies over the course of time. For social analysis, the research might engage local residents in focus groups, surveys and tell their perspective and narrative using social science ethnographic methods or perhaps social network analysis to examine the collective impact of organizations and individuals. Policy and program evaluations often lend themselves to case studies that describe how new practices and policies are adopted and implemented in cities. For example, classic public policy program evaluation might attempt to assess the return on investment of public or nonprofit funds and estimate the other economic benefits that flow from the urban greening strategy or treatment.

Research starts from the baseline definition that "urban greening" generally refers to the creation of an array of green spaces, which includes parks, public spaces, gardens, natural habitats, and greenways within a city's built environment. [1] Our focus is primarily about research on programs explicitly targeting vacant land, though occasionally research on parks and other established green spaces is referenced as potentially applicable. What is again critical for practitioners and policymakers is to recognize that research about one program intervention or policy in one community or neighborhood may not directly translate to another community or another type of urban greening strategy. Despite this limitation, the recent

urban greening research (as described in the translation brief and this supplemental section) documents that many of these strategies and techniques are working.

Here and in the translation brief we organize the key research findings into three general categories of how urban greening impacts communities: 1) community development/neighborhood stabilization; 2) social and public health; and 3) environmental/ecological. Although these categories may not apply to each and every research report or article, we found it does offer a convenient way to organize and frame the range of impacts and benefits that researchers have found from urban greening programs on vacant land. The following bullet point list includes additional studies and articles not found in the translation brief.

I. Neighborhood Stabilization & Community/Economic Development

A. Increases Surrounding Property Values

The assertion that greening goes hand in hand with increased property values dates back to the earliest days of urban park establishment. Research into this assertion has taken a number of forms, but most recent studies focused on vacant land greening compare property values before and after greening implementation. While this vacant land research has largely supported the notion that greening increases property values, two of the five studies noted here also highlight the potential for greening interventions to affect neighborhoods differently depending on characteristics of both the neighborhoods and the greening interventions.

- Three studies of the pioneering Philadelphia LandCare program's simple vacant land management treatment (e.g., removal of debris, plant grass and trees are planted, and erect a split-rail fence to prevent dumping) shows that property values nearby are increased as a result of the program. [3, 4, 38]
    - Two of the studies compared property values for homes immediately adjacent to greened lots to the sale prices of a typical home, finding in a neighborhood-specific study that properties adjacent to greened lots were worth 30% more [3] while a city-wide replication found that adjacent property values increased by 11%. [38]
    - The third study looks at price differences for properties within 500 feet of greened lots before and after greening and compared those to the changes in price for properties surrounding un-greened lots, finding that values increased more rapidly in the vicinity of greened lots. [4]
- One study that compared property values around vacant lots before and after the establishment of community gardens in New York City found a significant increase in property values within 1,000 feet of the garden, with positive gains increasing over time.

[39] This study compared property values within 1,000 feet of 636 gardens before and after garden establishment to property values more than 1,000 feet from a garden over the same timeframe. It found that properties in close proximity to gardens had lower values than comparable properties prior to the garden establishment, reflecting the negative impact of the vacant lot, and that property values increased after garden establishment, with higher impacts found in closer proximity to the gardens.

- A study of community gardens in St. Louis found that rents increased in close proximity to newly established community gardens more than they did in the larger surrounding communities, indicating a willingness to pay more to live near community gardens. [40] This study relied on data from the US Census to compare block groups within 1,500 feet of 54 community gardens to other block groups within the same census tracts, comparing data from 1990 (before garden establishment) to data from the 2000 census (after garden establishment). This study additionally found that rates of owner-occupancy increased more in the areas closest to the gardens.
- Two of these five studies further found that these impacts of greening vacant land are stronger in some neighborhoods than others, and that greening may have no impact on property values in some areas.
    - One study of the Philadelphia LandCare program found that property values increased in distressed neighborhoods more than they did in more stable real estate markets, but that the *most* distressed areas of the city did not see property value improvements as a result of greening. It further found that increases in property values also seemed to be contingent on the percentage of vacant land that had been greened, with higher rates of greening associated with increased property values. [4]
    - The study of community gardens in New York also found that neighborhood conditions influenced the effect of garden establishment, with gardens increasing property values in low-income but not high-income areas. It further found that garden quality influenced the garden impact, with high quality gardens leading to higher property value increases. [39]

Both of these studies highlight that positive impacts on property values for greening vacant land are by no means guaranteed, and that factors such as neighborhood conditions and the quality of the greening intervention are likely to influence outcomes.

- These findings are consistent with the literature on parks and green spaces. Numerous studies have found that parks, trees, and vegetation are all associated with higher property values. Though the “proximate principle” that parks increase property values in close proximity is widely accepted, other studies have shown that these impacts may

vary based on both neighborhood and park characteristics, such as crime rates (in high crime areas, parks are associated with lower property values [41]), park amenities and park maintenance levels. [41, 42]

B. Supplements Food Security Initiatives

Interest in urban agriculture, green infrastructure, and open space planning for vacant urban lands is burgeoning. In recent years, urban agriculture has received increasing support as a strategy for food security and urban sustainability. Using vacant land as a resource for local food production is growing rapidly worldwide as an answer to community food insecurity and urban food deserts. [25, 61]. Many community gardeners see economic benefits to gardening in the food that is produced, either for their own consumption, sharing, or sale in local communities.

- An ethnographic study of gardens in the Loisaida neighborhood of New York City noted that while residents have a variety of reasons for participating in community gardens, many gardeners see the gardens as economic resources primarily for growing food. [36]
- A review of four studies on gardens and vegetable consumption noted that three studies showed gardeners to consume more vegetables than non-gardeners. While the fourth did not compare gardeners to non-gardeners, it found that gardeners self-reported greater consumption of vegetables while they were gardening in comparison to times when they were not gardening. [48]
- A study of gardens in the Mantua neighborhood of Philadelphia, PA using both participation observation and interviews with gardeners noted that gardeners tended to share their produce with neighbors and members of their church communities. [62]
- Early data suggest that urban specialty crop cultivation can be quite productive, yielding 2–7 kg/m^2, depending on crop and conditions. [63]
- A study Of Oakland's vacant lots, open space, and underutilized parks with agricultural potential estimates that, in the most conservative scenario, potential contribution of these sites to the city's current and recommended vegetable needs to would contribute between 2.9 and 7.3% of current consumption, depending on production methods, or 0.6–1.5% of recommended consumption. These figures were obtained using geographic information systems and aerial imagery to identify potential sites for urban agriculture and modeling expected yields based on three different management strategies and four different land use scenarios. [64]
- A study of Philadelphia community gardens suggested that they may be important sites for promoting environmental awareness and "ecological citizenship." This study involved site visits and interviews at 7 gardens that engaged both community members and more

established nonprofit organizations and specifically highlighted the gardens as promoting inclusion of people often marginalized or excluded from the "agrifood system" and the role of the gardens as sites of social learning. [65]

II. Public and Social Health

C. Improves Physical & Mental Health

Green space is widely regarded as a health-promoting characteristic of residential environments, and has been linked to health benefits such as reduced stress and increased physical activity. The evidence, however, mainly concerns the short-term restorative benefits of single experiences with nature, while consistent and objective measurement of both exposure to nature and long term health-related outcomes remains elusive. Nonetheless, research findings bear potentially important implications for the future study of urban vacant lot greening as a tool to enhance health.

- The same study of Philadelphia LandCare that found that greening of vacant lots was linked to reduced gun assaults also found that the program was associated with reduced stress and greater reported exercise for nearby residents, though not in all neighborhoods. At the same time, however, the study's estimates for poor health outcomes showed that greening resulted in consistent, statistically significant increases for high cholesterol, running counter to prior work. The researchers suggest that findings of the research pertaining to health outcomes are to be considered suggestive [16]

- A study conducted in the UK used panel data from the British Household Panel Survey to explore how moving to a greener or less green area may affect mental health over time. Results show that, compared with pre-move mental health scores, moving to greener urban areas was associated with sustained mental health improvements, suggesting that environmental policies to increase urban green space may have sustainable public health benefits. [47]

- Four studies of community gardeners have found that they eat more fresh vegetables than non-gardeners in similar geographic areas. Another study that did not include comparisons to non-gardeners found that gardeners report eating more vegetables while participating in the community garden. [48, 49]

- A study of participants in one community gardening organization in Salt Lake City, Utah found that active men and women community gardeners' s had lower BMIs than non-participating neighbors, spouses and siblings. For example, women community

gardeners had significantly lower BMIs compared to their sisters (-1.88) and men community gardeners compared to their brothers (-1.33). Even though findings may not generalize to gardening organizations elsewhere, results of this study suggest that community gardens could be a neighborhood feature that promotes health. [50]

- A study conducted in Detroit, MI, USA, found that ragweed, one of the most prolific producers of allergenic pollen in North America, is predominantly found in vacant lots; the management of these lots could therefore have large impacts on allergenic pollen exposure for people who live near vacant lots. [51]

- These findings are again consistent with the larger literature on parks, trees, and vegetation. More than 15 studies have shown positive health benefits of living near parks and high levels of vegetation, including increased physical activity, improved birth outcomes, improved mental health, and reduced incidence of asthma.[52-55]

D. Positive Impacts Neighborhood Crime

Though greening vacant spaces may not singlehandedly reduce crime rates, some research indicates that this strategy has a positive influence on neighborhoods and is sometime associated with reductions in violent crime. The same results may not be reflected in all cities, nonetheless changing the physical appearance of a neighborhood though cleaning and greening may make it difficult for people to hide illegal guns and conduct other illegal activities, thus creating an environment where people feel safer. These results are consistent with long standing social psychological research on the relationship of physical disorder and social disorder under the rubric of the Broken Window Theory. [43]

- A study of the impacts of the Philadelphia LandCare program described above found that incidence of police-reported crimes decreased around greened lots when compared to the areas surrounding vacant lots that had not been greened. Across 4 sections of the city of Philadelphia, 4,436 vacant lots totaling over 7.8 million square feet were greened from 1999 to 2008. Estimate from a regression model showed that vacant lot greening was linked with consistent reductions in gun assaults across all 4 sections of the city and consistent reductions in vandalism in 1 section of the city. [16]

- A small random trial of the greening intervention used by the PLC program in which a single lot was randomly selected for greening found non-statistically significant reduction in overall crime in the area surrounding the lot when compared to a non-greened control, though statistical analysis was hampered by the small study size. This

same study also interviewed residents surrounding the greened and non-greened lots and found that residents felt safer after greening had occurred. [44]

- These findings are consistent with previous research on the impacts of greening and vegetation on safety and crime. A study investigating the effect of different landscaping options in urban public housing found that tree planting and proper grass maintenance had a clear positive effect on residents' sense of safety. In another study, police crime reports were used to examine the relationship between vegetation and crime in an inner-city neighborhood. Comparing crime rates for 98 apartment buildings with varying levels of nearby vegetation, results indicate that public housing buildings with high levels of vegetation nearby had 48% fewer reported property crimes and 56% fewer violent crimes than buildings with low levels of vegetation. [12, 45]

- A study of community gardens and crime in Houston, TX did not find any direct impacts on property crimes of community gardens but did find that residents reported decreased illegal activity after the gardens were established, suggesting that perceptions of safety and crime changed even if actual rates did not. [46]

E. Facilitates Social Interactions

Several studies have examined the role of greening projects in facilitating social interaction within neighborhoods. Their findings suggest the impacts of greening go beyond the physical improvements to the landscape to improve social conditions, often for residents directly involved in greening efforts, though potentially for other residents as well. The general idea here is that green spaces provide both physical space and a purpose for increased community interactions. That being said, the social dynamics of greening can be complex and may lead to disagreements or resentments within communities in addition to potential positive impacts.

- Community gardens, by virtue of usually being organized by and facilitating interactions between community members, are often cited as increasing efficacy and building a sense community for participants. A study that involved semi-structured interviews with 67 urban gardeners from Denver, Colorado found that gardeners "were drawn to gardens and stayed with the gardens because of the social opportunities they offered." The gardens were described as facilitating trusting social interactions, though, like any social enterprise, gardens are not free from social conflict. [56]

- Community gardens can take on the role of neighborhood gathering spaces, often used for large formal events in addition to informal gatherings. A study that involved interviews with gardeners and employees of supporting non-profits as well as

observations of Latino community gardens in New York City noted that the gardens were frequently used to host a range of events including neighborhood and church gatherings and were sometimes used to promote community activism more broadly. [57] A history of public gardens in the US notes that gardens tend to be used as both "public catalyst and private resource" highlighting them as locations for formal and informal community gatherings. [58]

- Parks and gardens can facilitate interactions among a diverse range of residents and may help to bridge racial, economic, and cultural divides between and within communities. A study which involved telephone surveys of 180 black and white community gardeners in St. Louis, MO found that while community gardens may remain somewhat racially segregated, they do tend to involve gardeners in contacts with members of other racial groups and gardeners report feeling that their gardening activities promote more interracial interaction. [59]

- Community gardens may help build social capital and function as catalyst for social cohesion and participation in ongoing gardening activities within a community can instill empowerment and sense of ownership in individuals, but this is not true for every project.

  A study of social impacts of community greening in Chicago involved semi-structured interviews of residents near four greenings sites - two of which had been deemed successful by local practitioners and two of which had not. Though there were reports of positive outcomes and feelings of empowerment that was not true for all residents at any of the sites - even the two deemed successful. The study concluded that "[e]empowerment outcomes from urban and community forestry projects are possible but far from a given" and that the method of implementation and degree of participation of many diverse community members is part of the equation. Where residents felt incorporated and received support, they felt empowered. When projects were seen as the pet project of a single person or small sub-group, they did not provide the same kinds of community social benefits. [9]

- Using data from a national survey and 96 expert interviews of public gardens and government officials, a study investigating public gardens motivations and activities confirmed that public gardens play a meaningful role in community development, particularly in urban areas. Public gardens are cultural institutions growing collections of plants for educational purposes and employing professional staff. Among other pursuits, they partner with local governments to provide technical expertise to school gardens,

train communities to grow food, and advocate for sustainability and environmental stewardship. [60]

- An ethnographic study of community gardens in a neighborhood of New York City found that residents participating in gardening as a means of creating safe outdoor spaces that would address both negative influences of the lots - especially drug dealing - and alleviate space constraints due to the small size of their living quarters. Gardeners in this study noted the gardens as important social spaces that helped them feel connected to their larger communities. [36]

- Generally speaking, green space supports social cohesion by establishing and expanding social networks, which provide the basis for community building.[59] A research project conducted in a public housing development in Chicago found that residents living closer to green common spaces, in comparison to those living near barren spaces used common spaces more and tended to enjoy "more social activities and more visitors, know more of their neighbors, and have stronger feelings of belonging." [18] Basically, common green areas facilitate the development and preservation of stronger social ties.

F. Supports Social Justice and Equity

Environmental gentrification is the process of environmental quality renewal accompanying the influx of affluent people often displacing old time residents that find themselves priced out of their own neighborhoods as they become more sought-after and valuable. An emerging view in the literature is that environmental improvements, such as vacant lots beautification and creation of community gardens, can become a catalyst for or contribute to gentrification of the neighborhoods they aim to revitalize. Most of the studies, however, have been conducted in areas with strong real estate markets. Research findings, in fact, appear to suggest that gentrification tends to happen in cities with tight housing markets and in a select number of neighborhoods. In legacy cities that have suffered from extensive housing vacancy and abandonment, the modest levels of community revitalization brought by environmental improvements do not lead to significant levels of displacement pressure.

- Research about the Philadelphia LandCare program demonstrates that its program reduced disparities in neighborhood greenness related to race and socioeconomic status. The study found that, even though some racial and economic differences exist, overall, more than 45,000 people and 16,00 households in Philadelphia now have access to green space within half a mile of their residence thanks to the PLC program [72]

- Neighborhood green spaces, including both parks and community gardens, may provide ideal locations for fostering learning opportunities for neighborhood youth, including STEM (science, technology, engineering, and math) education. [73]
- A study by Wolch, Byrne and Newell found that gentrification and displacement can occur as a result of greening initiatives if property values are increased. [19] This research, however, is largely based on a case study in Hangzhou, China, and articles about major and highly visible park redevelopment projects in large and fast growing US cites (e.g., the Highline in New York City and Goanus Canal in Brooklyn. While the results of the analysis bring forward relevant considerations on the nexus between inequality and gentrification and environmental improvements, the results do not necessarily apply to legacy cities in the US, which are the focus of this brief. Differences in governance, social dimensions and real estate markets dynamics may limit the generalization of these findings to other cities.

III. Environment and Ecosystem

A. Address Stormwater Runoff and Combined Sewer Overflows

In cities with coincident overabundance of stormwater volume and vacant land, reclaimed lots have the potential for reuse in detention of excess stormwater runoff. Green infrastructure attempts to model nature and reinstate predevelopment hydrologic characteristics through infiltrating, storing, filtering, evaporating, and detaining runoff, thus leading to a better quality of water recharge for underground aquifer reserve. [66, 67] Using green infrastructure techniques, vacant lots may be transformed into lot-scale rain gardens or aggregated into larger-scale, landscape features that incorporate constructed wetlands and retention ponds addressing stormwater mitigation and alleviating combined sewer overflow.

Water quality improvement and runoff volume control, which results in improved erosion and sediment control, are perhaps the most significant capabilities of green infrastructure practices.[68] Green infrastructure conversion, however, is not a one-step solution and is very much site-specific. Soil quality and characteristics should be assessed during the project planning phase, and initial reconditioning should be done before vegetation is established. In addition, survivability of the planting sites is an important requirement to establish long-term success.

- A report to the Illinois Environmental Protection Agency highlights how green infrastructure practices are found to be effective in reducing stormwater peak flows and runoff volumes, both of which increase flooding and sedimentation risks. To evaluate the effectiveness and benefits of five different green infrastructure features (bio infiltration, permeable pavement, filtration, green roof and constructed wetland), the report used data from peer-

reviewed publications to evaluate four relevant factors representing common stormwater management challenges in urban areas: runoff volume, peak flow, total suspended solids (TSS), and total nitrogen (TN). The analysis indicated that green infrastructure generally succeeds in reducing both the TSS and TN mean concentration, thus improving stormwater runoff quality. Reductions in average peak flow ranged from 52 to 70%, while runoff volume was mitigated by 57 to 85%. [27]

- A study in Cleveland, OH demonstrates that properly designed and managed infiltration-type green infrastructure may result in a vacant lot that has sufficient capacity for detention of the average annual rainfall volume for a major Midwestern US city. The researchers evaluated soil physical and hydrologic characteristics of 52 vacant lots in Cleveland that were the result of different eras of demolition, and run simulations of rainfall-runoff models with existing conditions and prospective green infrastructure conversion. Although the typical vacant lot is a net producer of runoff volume, results indicate that improvement to the demolition and maintenance process to include complete removal of superstructure and debris, placing of appropriate infill material, and establishment of a protective vegetative cover can improve infiltration opportunities. Reconditioning of urban soils to adjust drainage characteristics, improve soil structure, and mitigate compaction might be necessary to support green infrastructure [28]

B. Address Aspects of Climate Change

Functionality provided by green space in urban environments has becoming increasingly relevant in the context of planning for mitigation and adaptation to climate change. Conversion of underutilized vacant land into green infrastructure with combined social–ecological amenities could provide increased resilience to predicted near-term effects of climate change, such as predicted increases in stormwater runoff and urban heat. [69]

- Increasing green areas (and moisture that cools the air) can help reduce urban heat island effect and reduce energy consumption to maintain cooler temperatures. [29, 70, 71] A study on the potential energy savings in buildings by an urban tree planting program in California found that existing trees are projected to reduce annual air conditioning energy use by 2.5% with a wholesale value of $ 485.8 million. Using tree cover data from aerial photo interpretation and computer simulations of the relative effects of different tree configurations on building energy use, researchers determined that planting 50 million trees to shade east and west walls of residential buildings is projected to reduce cooling by 1.1% and peak load demand by 4.5% over a 15-year period. [21]

- Urban afforestation of vacant lots can contribute to carbon sequestration. A 2005 study used urban tree field data from 28 cities and 6 states in the US to determine the total urban forest carbon storage and annual sequestration by state and nationally. Relying on results from previous estimates of rate of carbon storage per square meter of tree cover, total tree carbon storage in U.S. urban areas was estimated at 643 million tons ($50.5 billion value) and annual sequestration was estimated at 25.6 million tons ($2.0 billion value). [20]

References:

1. De Sousa, C., *The greening of urban post-industrial landscapes: past practices and emerging trends.* Local Environment, 2014. **19**(10): p. 1049-1067.
3. Wachter, S., *The Determinants of Neighborhood Transformation in Philadelphia: Identification and Analysis—The New Kensington Pilot Study*. 2004, William Penn Foundation: Philadelphia.
4. Heckert, M. and J. Mennis, *The economic impact of greening urban vacant land: a spatial difference-in-differences analysis.* Environment and Planning A, 2012. **44**(12): p. 3010-3027.
9. Westphal, L.M., *Social Aspects of Urban Forestry: Urban Greening and Social Benefits: a Study of Empowerment Outcomes.* Journal of Arboriculture 2003. **29**(3): p. 137-147.
12. Kuo, F.E., M. Bacaicoa, and W.C. Sullivan, *Transforming Inner-City Landscapes: Trees, Sense of Safety, and Preference.* Environment and Behavior, 1998. **30**(1): p. 28-59.
16. Branas, C.C., et al., *A Difference-in-Differences Analysis of Health, Safety, and Greening Vacant Urban Space.* American Journal of Epidemiology, 2011.
18. Kuo, F., et al., *Fertile Ground for Community: Inner-City Neighborhood Common Spaces.* American Journal of Community Psychology, 1998. **26**(6): p. 823-851.
19. Wolch, J.R., J. Byrne, and J.P. Newell, *Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'.* Landscape and Urban Planning, 2014. **125**(0): p. 234-244.
20. Nowak, D.J., et al., *Carbon storage and sequestration by trees in urban and community areas of the United States.* Environmental Pollution, 2013. **178**(0): p. 229-236.
21. McPherson, E.G. and J.R. Simpson, *Potential energy savings in buildings by an urban tree planting programme in California.* Urban Forestry & Urban Greening, 2003. **2**(2): p. 73-86.
25. Gardiner, M.M., C.E. Burkman, and S.P. Prajzner, *The Value of Urban Vacant Land to Support Arthropod Biodiversity and Ecosystem Services.* Environmental Entomology, 2013. **42**(6): p. 1123-1136.
27. Jaffe, M.S., *Using green infrastructure to manage urban stormwater quality a review of selected practices and state programs*. 2010, Illinois Environmental Protection Agency: Springfield, Ill.
28. Shuster, W.D., et al., *Residential demolition and its impact on vacant lot hydrology: Implications for the management of stormwater and sewer system overflows.* Landscape and Urban Planning, 2014. **125**(0): p. 48-56.
29. Haase, D., A. Haase, and D. Rink, *Conceptualizing the nexus between urban shrinkage and ecosystem services.* Landscape and Urban Planning, 2014. **132**(0): p. 159-169.
36. Schmelzkopf, K., *Urban Community Gardens as contested space.* Geographical Review, 1995. **85**(3): p. 364-381.
38. Wachter, S.M. and K.C. Gillen, *Public Investment Strategies: How They Matter for Neighborhoods in Philadelphia*. 2006, Philadelphia, PA: Wharton School of Business, University of Pennsylvania.
39. Voicu, I. and V. Been, *The Effect of Community Gardens on Neighboring Property Values.* Real Estate Economics, 2008. **36**(2): p. 241-283.
40. Tranel, M. and L.B. Handlin, *METROMORPHOSIS: DOCUMENTING CHANGE1.* Journal of Urban Affairs, 2006. **28**(2): p. 151-167.

41. Troy, A. and J.M. Grove, *Property values, parks, and crime: A hedonic analysis in Baltimore, MD.* Landscape and Urban Planning, 2008. **87**(3): p. 233-245.
42. Crompton, J.L., *The Impact of Parks on Property Values: A Review of the Empirical Evidence.* Journal of Leisure Research, 2001. **33**(1): p. 1-31.
43. Wilson, J.Q. and G.L. Kelling, *Making Neighborhoods Safe*, in *The Atlantic*. 1989, Atlantic Media, Inc.: Boston. p. 46.
44. Garvin, E.C., C.C. Cannuscio, and C.C. Branas, *Greening vacant lots to reduce violent crime: a randomised controlled trial.* Injury Prevention, 2012.
45. Kuo, F.E. and W.C. Sullivan, *Environment and Crime in the Inner City: Does Vegetation Reduce Crime?* Environment and Behavior, 2001. **33**(3): p. 343-367.
46. Gorham, M.R., et al., *The impact of community gardens on numbers of property crimes in urban Houston.* HortTechnology, 2009. **19**(2): p. 291-296.
47. Alcock, I., et al., *Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas.* Environmental Science & Technology, 2013. **48**(2): p. 1247-1255.
48. McCormack, L.A., et al., *Review of the Nutritional Implications of Farmers' Markets and Community Gardens: A Call for Evaluation and Research Efforts.* Journal of the American Dietetic Association, 2010. **110**(3): p. 399-408.
49. Litt, J., et al., *The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption.* American Journal of Public Health, 2011. **101**(8): p. 1466-73.
50. Zick, C.D., et al., *Harvesting More Than Vegetables: The Potential Weight Control Benefits of Community Gardening.* American Journal of Public Health, 2013. **103**(6): p. 1110-1115.
51. Katz, D.S.W., B.T. Connor Barrie, and T.S. Carey, *Urban ragweed populations in vacant lots: An ecological perspective on management.* Urban Forestry & Urban Greening, 2014(0).
52. Cohen, D.A., et al., *Contribution of Public Parks to Physical Activity.* American Journal of Public Health, 2007. **97**(3): p. 509-514.
53. Lovasi, G.S., et al., *Children living in areas with more street trees have lower prevalence of asthma.* Journal of Epidemiology and Community Health, 2008. **62**(7): p. 647-649.
54. Hystad, P., et al., *Residential Greenness and Birth Outcomes: Evaluating the Influence of Spatially Correlated Built-Environment Factors.* Environ Health Perspectives, 2014. **122**(10): p. 1095-1102.
55. Hartig, T., M. Mang, and G.W. Evans, *Restorative Effects of Natural Environment Experiences.* Environment and Behavior, 1991. **23**(1): p. 3-26.
56. Teig, E., et al., *Collective Efficacy in Denver, Colorado: Strengthening Neighborhoods and Health through Community Gardens.* 2009. **15**: p. 1115-1122.
57. Saldivar-Tanaka, L. and M.E. Krasny, *Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City.* Agriculture and Human Values, 2004. **21**(4): p. 399-412.
58. Lawson, L., *The Planner in the Garden: A Historical View into the Relationship between Planning and Community Gardens.* Journal of Planning History, 2004. **3**(2): p. 151-176.
59. Shinew, K.J., T.D. Glover, and D.C. Parry, *Leisure Spaces as Potential Sites for Interracial Interaction: Community Gardens in Urban Areas.* Journal of Leisure Research, 2004. **36**(3): p. 336-355.
60. Gough, M.Z. and J. Accordino, *Public Gardens as Sustainable Community Development Partners: Motivations, Perceived Benefits, and Challenges.* Urban Affairs Review, 2013. **49**(6): p. 851-887.
61. Colasanti, K.J.A., M.W. Hamm, and C.M. Litjens, *The City as an "Agricultural Powerhouse"? Perspectives on Expanding Urban Agriculture from Detroit, Michigan.* Urban Geography, 2012. **33**(3): p. 348-369.

62. Hanna, A.K. and P. Oh, *Rethinking Urban Poverty: A Look at Community Gardens.* Bulletin of Science, Technology & Society, 2000. **20**(3): p. 207-216.
63. Beniston, J. and R. Lal, *Improving Soil Quality for Urban Agriculture in the North Central U.S*, in *Carbon Sequestration in Urban Ecosystems*, R. Lal and B. Augustin, Editors. 2012, Springer Netherlands. p. 279-313.
64. McClintock, N., J. Cooper, and S. Khandeshi, *Assessing the potential contribution of vacant land to urban vegetable production and consumption in Oakland, California.* Landscape and Urban Planning, 2013. **111**(0): p. 46-58.
65. Travaline, K. and C. Hunold, *Urban agriculture and ecological citizenship in Philadelphia.* Local Enviroment, 2010. **15**(6): p. 581–590.
66. Niemczynowicz, J., *Urban hydrology and water management – present and future challenges.* Urban Water, 1999. **1**(1): p. 1-14.
67. Keeley, M., et al., *Perspectives on the Use of Green Infrastructure for Stormwater Management in Cleveland and Milwaukee.* Environmental Management, 2013. **51**(6): p. 1093-1108.
69. Lovell, S. and J. Taylor, *Supplying urban ecosystem services through multifunctional green infrastructure in the United States.* Landscape Ecology, 2013. **28**(8): p. 1447-1463.
70. Younger, M., et al., *The Built Environment, Climate Change, and Health: Opportunities for Co-Benefits.* American Journal of Preventive Medicine, 2008. **35**(5): p. 517-526.
71. Office of Atmospheric Programs EPA, *Reducing urban heat islands: compendium of strategies*. 2008.
72. Heckert, M., *Access and Equity in Greenspace Provision: A Comparison of Methods to Assess the Impacts of Greening Vacant Land.* Transactions in GIS, 2013. **17**(6): p. 808-827.
73. Krasny, M.E. and K.G. Tidball, *Community Gardens as Contexts for Science, Stewardship,and Civic Action Learning.* Cities And The Environment, 2009. **2**(1).