Ecosystems

Actions

N14   Promote sustainable landscaping practices for residential, commercial, and industrial properties.

A13   Develop guidelines for city property on application of fertilizers, herbicides, pesticides, and animal waste.

A14   Collaborate with landscaping and fertilizer companies to improve services and use of products.

A15   Implement educational campaign for landowners to promote responsible use of fertilizers, herbicides, and pesticides.

A16   Collaborate with organizations, agencies, and private landowners to identify and create additional green space, urban tree canopy, and urban farms.

Background

Increasing temperatures elevate risks to freshwater ecosystems and cause shifts in natural resources. As temperatures warm, fish and wildlife habitats change, forcing plants and animals to migrate or adapt.[1] The term 'ecosystem' refers to all of the living organisms in an area and the non-living things with which they interact (e.g., soil, rivers and streams, and the atmosphere). Biological and physical environments provide numerous benefits to our communities; these benefits are referred to as ecosystem services. They influence human health and well-being, help regulate the climate, and contribute to the local economy. Some of these services are direct and tangible, such as the presence of fresh water available for consumption and food sources derived from crops and fisheries. Others, such as quantifying the exact amount of carbon dioxide sequestered by a grove of trees or calculating the aesthetic and recreational value of a forest preserve, are more abstract.

In Columbus, we have a variety of beneficial ecosystems including the major rivers and the reservoirs into which they feed, more than 12,000 acres of parks and 13 nature preserves, and the nearby farms and fields that sustain agriculture. No matter the size, it is important to understand how these ecosystems are threatened by climate change. For example, extended droughts can lead to a reduced water supply, which may result in higher mortality of non-drought tolerant plant species. Invasive plants adapted to longer growing seasons (e.g., purple loosestrife and honeysuckles) decimate native plants and jeopardize wildlife. Increased extreme precipitation events in Columbus produce more stormwater runoff, introducing more nutrients, pollutants, and sediment from urban landscapes and transporting them downstream to communities along the Scioto and Ohio Rivers.

How we choose to respond to changing conditions is important as well. In January 2018, the *Ohio Department of Agriculture* established new rules, guided by scientific-studies, prohibiting the sale and distribution of certain invasive plants in Ohio.[2] Recent efforts have provided a detailed look at the full costs and benefits of trees located in major Ohio cities, with the trees providing benefits that are up to five times greater than costs.[3] Columbus has a *Tree Protection and Mitigation Executive Order*, enacted in 2015, to limit the removal of or damage to all trees on city property or along rights of way during development and construction.[4] Limiting the use of fertilizers, herbicides, and pesticides; growing native plants; and mitigating runoff through rain barrels or rain gardens are all effective, readily available practices. These measures can be adopted by residents, businesses, and the City, and several existing programs offer cost-sharing incentives. By decreasing pollutant runoff, Columbus can serve as a role model for other communities in how we care for our ecosystems.

This chapter contains one necessary (N) and four aspirational (A) actions. Three promote the responsible use of fertilizers, herbicides, and pesticides, whether it is on residential lawns or large industrial properties. The other two encourage adoption of sustainable landscaping practices and the expansion of urban greenspaces. Through these actions, we can make Columbus' varied ecosystems more resilient to climate change so that our community can continue to benefit from their invaluable services.

N14 **Promote sustainable landscaping practices for residential, commercial, and industrial properties.**

The City should build on the existing educational programming that it provides through the *Greenspot* and *Get Grassy!* programs to further promote and emphasize the importance of sustainable landscaping practices for residential, commercial, and industrial properties.[5, 6] Sustainable landscapes are those that maintain themselves (without undue labor, costs, or need for significant water, fertilizer, herbicides, and pesticides) while limiting negative impacts on surrounding natural ecosystems. Native species, adapted to the climate and pests of Central Ohio, are prime candidates to plant for sustainability. Since they require little to no treatment with fertilizers, herbicides, and pesticides, there are fewer costs associated with landscaping inputs. Likewise, these species serve as habitat and food sources for wildlife, are often drought tolerant, reduce erosion, and absorb stormwater. To maximize benefits, these plants should be appropriately grouped and planted consistently according to site conditions.

Promotion of sustainable landscaping practices should continue with the *Community Backyards* program that offers rebates for the purchase of native plants.[7] This program is implemented through a partnership with Franklin Soil and Water Conservation District (FSWCD), advertised through GreenSpot, and could be extended to a larger network of agencies with similar missions, many of whom are already actively involved in the Greenspot Advisory Board (e.g., Franklin Park Conservatory, Columbus Franklin County Metro Parks, National Wildlife Federation (NWF), Grange Insurance Audubon Center, and Franklin County Master Gardeners), and businesses selling related products and services (e.g., engineers, architects, landscape architects, nurseries, garden centers, and landscaping companies). Elsewhere in the country, the Chesapeake Bay

Region and cities in the Western United States are examples of places working to transition their landscaping practices to embrace species adapted to local conditions.[8, 9] Successes and challenges to implementing these programs in other communities could offer valuable lessons for Columbus. For instance, attention should be given to prior research on landowners' practices and local surveys conducted to determine what motivates individuals to select landscapes that promote holistic, long-term ecosystem health. While many landowners may be willing and able to change their practices, obstacles include the accepted sense of aesthetic beauty, expectations of neighbors and customers, lack of awareness or knowledge, and costs.

Branch Out Columbus should also consider revisiting the goals of the program and embrace sustainable landscaping practices within its mission.[10] As our climate warms and winter hardiness changes, our growing zones are shifting northwestward.[11] Failure to consider this shift and the impacts on insect species could result in premature mortality of many of the trees that are currently being planted. To mitigate widespread damage to the tree canopy due to invasive species, greater awareness for tree diversity should be fostered, and efforts should be made to avoid monocultures within neighborhoods. While the list of species promoted by Branch Out Columbus already includes urban-tolerant and a number of native species, the list should expand, adding species that will be suited to the anticipated climate of the future.

Finally, city ordinances, zoning codes, and policies should be reviewed to ensure that they promote, or at least do not dissuade, property owners from installing sustainable landscaping. For instance, in 2017 the City removed the milkweed plant from the noxious weeds list. Rights of way, such as those along roads, should be considered for wildflower planting so long as

they do not block visibility or contribute to safety issues; a similar program is being conducted by the *Ohio Department of Transportation*, which has approximately 19,000 miles of right of way in the state of Ohio.[12] The Department of Building and Zoning Services and the Department of Development are critical stakeholders that should be involved in conversations about the specifics of actions taken by the City on this issue.

| A13 | **Develop guidelines for city property on application of fertilizers, herbicides, pesticides, and animal waste.** |

State law prohibits the City from regulating fertilizers, herbicides, and pesticides.[13, 14, 15, 16] This prohibition on local regulation extends to the registration, packaging, labeling, sale, storage, distribution, or use of fertilizers, herbicides, and pesticides.

However, Columbus can develop policies related to its use of fertilizers, herbicides, and pesticides within city limits and publicize these policies as examples of best management practices (BMPs). The City Recreation and Parks Department (CRPD) is developing BMPs and associated policies for the application of herbicides and pesticides on park properties, including the use of organic products and a reduction in the amount and frequency of other product applications. Serving as a model for others, CRPD has obtained the *Environment Facilities Certification Program* certification from the Sports Turf Manager Association for its Berliner Park facility and is working toward certification from the *Audubon Cooperative Sanctuary Program* for its golf facilities.[17, 18] CRPD is one of only 33 in the nation to have this certification and the only one in Ohio to have obtained such an achievement.

The City has the authority to regulate animal waste disposal.[19, 20, 21, 22] Specifically, Columbus City Code Section 2329.01 prohibits the placement of animal waste, on public or private private property and within the waters of the city.[22] Violations of these code provisions can lead to enforcement by the City's Code Enforcement Section. Additionally, through the *PUP program*, the City works to proactively educate the public about the environmental impact of pet waste entering our waters and encourages residents to make simple behavior changes by picking up their pet waste using pet waste bags so that these impacts can be prevented.[23]

| A14 | **Collaborate with landscaping and fertilizer companies to improve services and use of products.** |

There is increasing demand for landscaping companies to use practices that minimize damage to the larger, regional ecosystem. Landscaping companies, as a group, work with a significant number of properties. The scale of land under their care creates a significant opportunity for tangible ecological benefits, while also providing a way to educate individual property owners. Since property owners may not know details of actions taken by their landscaping company, or the consequences of these actions, the City should have a vested interest in promoting responsible practices. Under Ohio Law, anyone who is hired to apply fertilizer, herbicides, and pesticides is considered an "applicator" and must be certified by the state. The certification involves both training and passing of an examination. While large companies are likely to be aware of this law and abide by it, smaller operators may not. An educational campaign could be conducted targeting landscaping companies. Likewise, the City should be aware of state regulations and refer companies that, through investigation, are not certified, do not abide by product labels, and/or do not follow state regulations.

Landscaping and fertilizer companies have an incentive to be good corporate citizens as many consumers are placing more emphasis on environmental sustainability. This is creating significant economic incentives to work collaboratively with government agencies, nonprofits, and retailers to reformulate products, refine instructions, and educate the public on their use. Scotts Miracle-Gro is an example of a company that has taken steps to reduce the environmental impact of their products. Scotts Miracle-Gro *removed phosphorus* from its lawn fertilizers, provides educational displays with its products, and introduced technology to its spreaders to reduce application on impervious surfaces.[24] For some companies, transitioning to more ecologically sustainable practices might involve offering services rather than products (e.g., lawns might need soil testing and aeration rather than sales of seed and fertilizer).

The City, in partnership with FSWCD, currently engages landscaping companies and residents on sustainable landscaping practices through the Get Grassy! programming discussed below. The City purchases products and services that are ecologically beneficial and grows their respective markets.[25] The City's Department of Public Utilities (DPU) also produces its own landscaping/fertilizer products, which are available to the

Get Grassy! Partners

Public Agencies, Professional Organizations, and Non-Profit Groups	
City of Columbus	Office of Franklin County Commissioners
Friends of Alum Creek and Tributaries	Ohio Lawn Care Association
Friends of the Lower Olentangy Watershed	OSU Turf Extension Specialists
Grange Insurance Audubon Center	Ohio Turfgrass Foundation
Mid-Ohio Regional Planning Commission	Sierra Club

Lawn Care Companies	
Bio Green Ohio	Safe Lawns
Good Nature Organic Lawn Care	Scotts LawnService (merged with TruGreen)
Grassroots Lawn & Irrigation Service	Watershed Organic Lawn Care

Table 2. *Get Grassy! partners and participating lawn-care companies.*

public as *Com-til Compost*.[26] The City could lead by example and use its platform as a compost producer to educate its customers about proper product application and sustainable landscaping practices.

A15 **Implement educational campaign for landowners to promote responsible use of fertilizers, herbicides, and pesticides.**

The City of Columbus and FSWCD, as part of a *municipal separate storm sewer systems education programming*, launched Get Grassy! in 2016 to promote sustainable landscaping practices.[27] The program encourages Central Ohio residents to care for their lawns, educating them about the benefits of deeper root systems, drought and disease tolerance, and the effects of lawn-care practices on water quality. The program's primary goal is to educate and encourage residents to adopt good stormwater practices that include: proper disposal of yard waste; greater height settings on lawn mowers; appropriate watering (amount and timing); correct application of fertilizers, herbicides, and pesticides; and maintaining rainwater on properties to prevent polluted runoff. The program works through local lawn-care companies and partner groups that distribute information about the program (Table 1). Get Grassy! developed a fun *"Seasonal How-To for Your Home Turf"* card for distribution that includes personalized logos for partners, a website with additional resources, a commitment pledge with incentives, and an outreach plan to engage more local lawn-care companies and residents.[28]

To date, at least 4,000 residents have been reached through targeted advertising and approximately 360 Columbus residents have pledged (the primary measure of engagement) to Get Grassy! The program successfully engages surrounding municipalities as well, garnering additional pledges outside the county and state (600 pledges in total). To promote this program, FSWCD has participated in community events; provided paid advertisement and received other marketing and publicity through social media and speaking engagements; exhibited at industry trade shows; and garnered new municipal funding support.

As with Greenspot, the Get Grassy! educational programming should collaborate further with other environmental and outdoor organizations and city departments and promote programs with similar missions (e.g., *National Audubon Society's Audubon At Home* and the *NWF's Certified Wildlife Habitat)*.[29, 30] Any educational campaign should take into account past studies that acknowledge the fact that individuals already applying chemicals to their lawns are more likely to believe that lawn-care practices have a negative impact on local water quality.[31] These studies suggest that efforts to educate individuals have generally not been sufficient to cause behavioral changes and that novel approaches should be attempted.

A16 **Collaborate with organizations, agencies, and private landowners to identify and create additional green space, urban tree canopy, and urban farms.**

Green Space Initiatives

Access to green spaces in all portions of the city should be prioritized as both new construction and redevelopment occurs. Green space has been shown to improve quality of life, and research suggests that there are public health consequences to how we design and develop our urban environments. Studies over the past decade have shown that office workers with access to plants and windows show greater satisfaction in their work and that

there are mental health benefits to moving to neighborhoods with greater green space.[32, 33, 34] Attention should be paid to the distribution of these spaces within the city and their proximity to where individuals live and work. CRPD's goal is to provide green space within a 10-minute walk of all residences.

CRPD, Columbus and Franklin County Metro Parks, and school districts within the city have a significant number of properties that can serve as models for demonstrating sustainable practices. These managed green spaces should promote healthy ecosystems and protect our waterways. For instance, fertilizer, herbicide, and pesticide applications should be tailored to the particular land use, and lawns that are unused for athletic fields should be considered for *prairie plantings (urban meadows)* that do not require lawn care.[35] As a majority of property within the city is privately held, working to educate and incentivize the establishment and preservation of green spaces on these properties are critical to success. Legal tools, such as *conservations easements*, are an example of such an incentive.[36] These easements are agreements between private property owners and conservation organizations, such as The Nature Conservancy or FSWCD.

Tree Canopy Initiatives

Branch Out Columbus is an initiative to plant 300,000 trees in Columbus by 2020.[10] The impetus for the program was a study that identified that the tree canopy cover is less than 15% in some portions of the city. CRPD is updating this 2014 Tree Canopy Study and intends to conduct an updated study every two years with U.S. Forest Service. The updates will capture the canopy cover of both trees being planted and those being removed. This will help identify and track areas of high-density development as well as areas where there are opportunities to plant additional trees. As was mentioned earlier

in this report, Branch Out Columbus is far below its goal, having only resulted in approximately 40,000 new trees being planted to date.

The lack of trees exacerbates the urban heat island, diminishes air quality, diminishes beneficial wildlife, and reduces aesthetic appeal of neighborhoods. For vulnerable populations, shade is especially important for quality of life, as homes might not have sufficient air conditioning for summer cooling. CRPD is currently working with the *City of Columbus Land Bank* to identify properties that are currently owned by Land Bank, but are being leased to adjacent residents as a rent-to-own program, to implement tree planting within these lots.[37] In addition to these current initiatives, the City should consider adopting a strategic plan for Branch Out Columbus with implementation strategies that describe how to meet the program's planting goals; this could include increasing public-private partnerships.

Urban Farming Initiatives

Urban farming is a growing phenomenon in the United States that repurposes abandoned and underutilized land within cities for food production, while simultaneously creating employment and volunteer opportunities for residents. Establishing a greater percentage of the food system in close proximity to residents, when coupled with educational programs, allows individuals to better understand and appreciate the complexity of growing and distributing food.[38] Columbus has farms that are managed as businesses, those that are run as non-profit organizations, and some landowners who grow food crops in their yards for distribution to the general public.[39] These farms support the local economy, provide income to entrepreneurs, offer food to vulnerable populations, and create additional green spaces.

The City should continue to implement the *Local Food Action Plan* (adopted in November 2016) and the *Green Business & Urban Agriculture Strategic Plan*.[40, 41] These plans call for supporting increases in local agriculture and promoting local purchasing by institutional buyers. Additionally, the City, through the *Columbus Foundation*, annually provides grants up to $2,000 for community gardeners.[42] *MidOhio Foodbank*, with funds from U.S. Department of Agriculture, provides grants up to $25,000 for urban agricultural infrastructure within Columbus.[43] The City should seek ways to partner with the statewide initiative *Ohio Smart Agriculture*.[44] This W.K. Kellogg Foundation funded project brings together a national non-profit organization (Solutions from the Land) with

The Ohio State University's *Initiative for Food and AgriCultural Transformation (InFACT)* to develop platforms of support for sustainable production of food, feed, fiber, energy and ecosystems in Ohio.[45]

Finally, the Department of Development Land Redevelopment Division has licensed 80 to 100 parcels for community garden and beautification projects. In support of those gardens, the Land Bank has provided 550 gallon tanks, topsoil, Com-Til from DPU, and vouchers for property improvements. All of these projects are excellent examples of the types of support the City should continue to provide to promote local food and urban farming.

References

1. Intergovernmental Panel on Climate Change. *Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects: Working Group II Contribution to the IPCC Fifth Assessment Report.* Vol. 1. Cambridge: Cambridge University Press, 2014. doi:10.1017/CBO9781107415379.

2. Ohio Admin. Code 901:5-30-01. *http://codes.ohio.gov/oac/901:5-30-01*. (Accessed Jan. 2018).

3. Ohio Woodlands Steward Program. "Why Trees Matter—A Focus on Urban Trees." The Ohio State University. *https://woodlandstewards.osu.edu/urban*. (Accessed Jan. 2018).

4. City of Columbus, Office of the Mayor. Executive Order 2015-01: *Tree Protection and Mitigation*. Columbus, OH. 2015. *https://www.columbus.gov/hr/Executive-Orders-and-Policies/*.

5. City of Columbus. "GreenSpot." City of Columbus, Office of Environmental Stewardship. *https://www.columbus.gov/GreenSpot/*. (Accessed Aug. 2018).

6. "Why Get Grassy." Get Grassy!. *http://www.getgrassy.org/*. (Accessed Aug. 2018).

7. "Community Backyards Program." Franklin Soil and Water Conservation District. *https://www.franklinswcd.org/community-backyards-program*. (Accessed Jan. 2018).

8. "Restoration of Chesapeake Bay." U.S. Environmental Protection Agency. Oct. 2017. *https://www.epa.gov/restoration-chesapeake-bay*. (Accessed May 2018).

9. "Xeriscape Plans." Denver Water. *https://www.denverwater.org/residential/rebates-and-conservation-tips/remodel-your-yard/xeriscape-plans*. (Accessed May 2018).

10. City of Columbus. "Branch Out Columbus." City of Columbus, Office of Sustainability. *https://www.columbus.gov/branch-out/*. (Accessed Jan. 2018).

11. USGCRP. *Climate Science Special Report: Fourth National Climate Assessment*. Vol. 1. Washington, DC: U.S. Global Change Research Program. doi: *10.7930/J0J964J6*.

12. "ODOT asking Ohioans to help with pollinator program." Ohio Department of Transportation. *http://www.dot.state.oh.us/news/Pages/2016/ODOT-asking-Ohioans-to-help-with-pollinator-program.aspx*. (Accessed Jan. 2018).

13. Ohio Revised Code 905.503. *http://codes.ohio.gov/orc/905.503*. (Accessed Feb. 2018).

14. Ohio Revised Code 921.06(C). *http://codes.ohio.gov/orc/921.06v1*. (Accessed Feb. 2018).

15. Bd. of Twp. *Trs. Sharon Twp. v. Zehringer*. 5th Dist. (Licking). 2011-Ohio-6885 (December 28, 2011).

16. *City of Fairview Park v. Barefoot Grass Lawn Serv*. 115 Ohio App. 3d 306 (6th Dist. 1996).

17. "Environmental Facility Certification Program." Sports Turf Managers Association. *https://www.stma.org/environmental-facility-certification-program/*. (Accessed Aug. 2018).

18 "About the Audubon Cooperative Sanctuary Program." Audubon International. *https://www.auduboninternational.org/acsp*. (Accessed Aug. 2018).

19 Columbus Code of Ordinances 919.16. https://library.municode.com/oh/columbus/codes/code_of_ordinances?nodeId=TIT9STPAPUPRCO_CH919PARURE_919.16LIIMRUTRPRPEOWRE. (Accessed Feb. 2018).

20 Columbus Code of Ordinances 1145.86. *https://library.municode.com/oh/columbus/codes/code_of_ordinances?nodeId=TIT11WASEELCO_CH1145SEUSRE_1145.80--1145.86ST_1145.86NORDISTSE*. (Accessed Feb. 2018).

21 Columbus Code of Ordinances 1111.10. *https://library.municode.com/oh/columbus/codes/code_of_ordinances?nodeId=TIT11WASEELCO_CH1111PRWA_1111.10DESUNESTWA*. (Accessed Feb. 2018).

22 Columbus Code of Ordinances 2329.01. *https://library.municode.com/oh/columbus/codes/code_of_ordinances?nodeId=TIT23GEOFCO_CH2329HESASAFERE_2329.01LINAUSLIRE*. (Accessed Feb. 2018).

23 "Pick Up Poop (PUP)." City of Columbus, Water Protection. *https://www.columbus.gov/PUP/*. (Accessed Jan. 2018).

24 Mary Vanac. "Scotts drops phosphorus from lawn fertilizer." *The Columbus Dispatch*. May 10, 2013. *http://www.dispatch.com/content/stories/business/2013/05/10/scotts-drops-phosphorus-from-lawn-fertilizer.html*. (Accessed Jan. 2018).

25 Columbus Code of Ordinances, Chapter 329. *https://library.municode.com/oh/columbus/codes/code_of_ordinances?nodeId=TIT3FITACO_CH329PRGOSEALPR*. (Accessed Jan. 2018).

26 City of Columbus. "Com-til." City of Columbus, Department of Public Utilities. *https://www.columbus.gov/utilities/water-protection/comtil/*. (Accessed Jan. 2018).

27 "Stormwater Discharges from Municipal Sources." U.S. Environmental Protection Agency. Sep. 2018. *https://www.epa.gov/npdes/stormwater-discharges-municipal-sources*. (Accessed Oct. 2018).

28 "Resources." Get Grassy!. *http://www.getgrassy.org/resources*. (Accessed Aug. 2018).

29 National Audubon Society. "Creating Bird-Friendly Communities." Audubon. *https://www.audubon.org/conservation/bird-friendly-communities*. (Accessed Aug. 2018).

30 The National Wildlife Federation. "Certify." National Wildlife Federation. *https://www.nwf.org/Garden-for-Wildlife/Certify*. (Accessed Aug. 2018).

31 Paul Robbins. *Lawn People*. Philadelphia: Temple University Press. 2007.

32 Dravigne, A., T. M. Waliczek, R. D. Lineberger, and J. M. Zajicek. "The effect of live plants and window views of green spaces on employee perceptions of job satisfaction." *HortScience* 43, no. 1 (2008): 183-187. *http://hortsci.ashspublications.org/content/43/1/183.abstract*.

33 Beyer, K.M., A. Kaltenbach, A. Szabo, S. Bogar, F. J. Nieto, and K. M. Malecki. "Exposure to neighborhood green space and mental health: Evidence from the survey of the health of Wisconsin." *Int J Environ Res Public Health* 11, no. 3 (2014): 3453–3472. *https://doi.org/10.3390/ijerph110303453*.

34 Alcock, I., M. P. White, B. W. Wheeler, L. E. Fleming, and M. H. Depledge. "Longitudinal effects on mental health of moving to greener and less green urban areas." *Environ. Sci. & Tech*. 48, no. 2 (2014): 1247-1255. DOI: 10.1021/es403688w.

35 "Hellbranch Meadows." Franklin Soil and Water Conservation District. *https://www.franklinswcd.org/hellbranch-meadows*. (Accessed Aug. 2018).

36 "Conservation Easements." Franklin Soil and Water Conservation District. *https://www.franklinswcd.org/conservation-easements*. (Accessed Aug. 2018).

37 City of Columbus. "Land Redevelopment." City of Columbus, Department of Development. *https://www.columbus.gov/development/Land-Redevelopment-Division/*. (Accessed Jan. 2018).

38 Terry McLean. "The Urban Agriculture trend continues in 2017." Michigan State University Extension. Jan. 2017. *http://msue.anr.msu.edu/news/the_urban_agriculture_trend_continues_in_2017*. (Accessed Jan. 2018)

39 OSU Extension, Franklin County. "Urban Agriculture." The Ohio State University. *https://franklin.osu.edu/program-areas/agriculture-and-natural-resources/urban-agriculture*. (Accessed Jan. 2018).

40 City of Columbus. "Local Food Action Plan." City of Columbus, Public Health. *https://www.columbus.gov/publichealth/programs/Local-Food-Action-Plan/*. (Accessed Aug. 2018).

41 City of Columbus. *Green Business & Urban Agriculture Strategic Plan*. Columbus, OH. June 2017. *https://www.columbus.gov/publichealth/programs/Local-Food-Plan/Plan-Development/*. Accessed Aug. 2018.

42 "City of Columbus and Franklin County Community Gardens Grant Program." The Columbus Foundation. *https://columbusfoundation.org/nonprofit-center/grant-opportunities/columbus-foundation-grants/columbus-and-franklin-county-garden-grants*. (Accessed Jan. 2018).

43 "2018 Urban Agriculture Grant." Mid-Ohio Foodbank. *https://www.midohiofoodbank.org/urbanagriculturegrant/*. (Accessed Jan. 2018).

44 "Our Resources." Ohio Smart Agriculture. *https://www.ohiosmartag.net/resources*. (Accessed Aug. 2018).

45 "Initiative for Food and AgriCulture Transformation (InFACT)." The Ohio State University. *https://discovery.osu.edu/food-and-agricultural-transformation-infact*. (Accessed Aug. 2018).