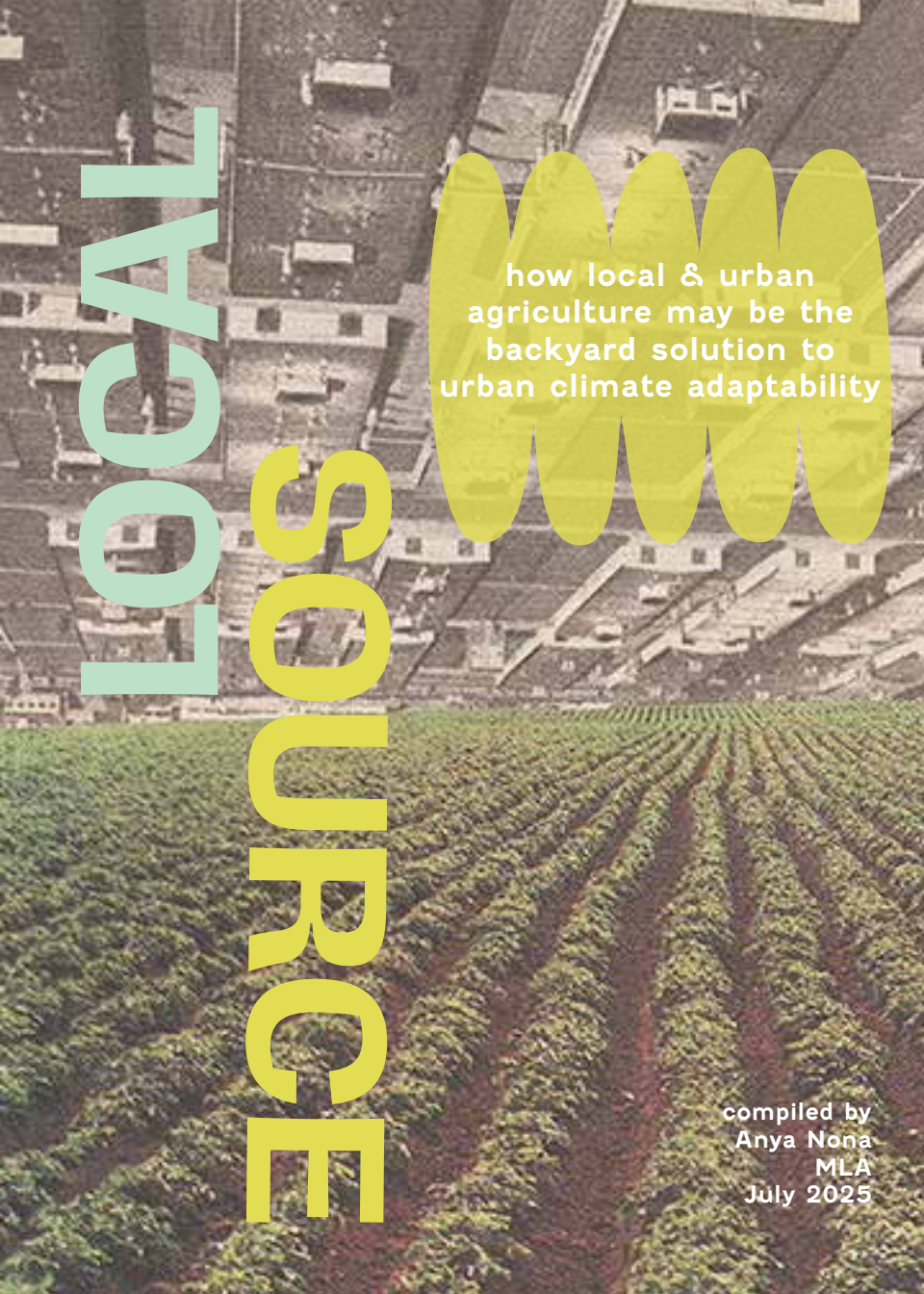


LOCAL SOURCE

how local & urban agriculture may be the backyard solution to urban climate adaptability

compiled by
Anya Nona
MLA
July 2025

MICHIGAN'S TOP CLIMATIC THREATS

Michigan will experience especially increased risks from **precipitation**, **heat**, and **flood** over the next 30 years.[15] These risks, through 2050 and beyond, may change depending on how much emissions are reduced in the near future. The city most at risk in Michigan is Detroit, **home to over 2,000 urban farms and gardens**.[8]

PRECIPITATION + FLOODING

Michigan will experience more extreme and intense precipitation events. Over the last half century, average **annual precipitation has increased by 5-10%**, and **rainfall during the four wettest days has increased by 35%**. (source#EPA) Spring rainfall and annual precipiation are likely to increase, and severity of storms will intensify. This will greatly **increase the risk of flooding events**.[16]

HEAT

Since 1951, average **temperatures have increased by 2.3°F** (1.3°C) **in the U.S. Great Lakes region**. By 2050, average air temperatures are projected to increase by 3 to 6°F (1.7 to 3.3°C). **By 2100, average air temperatures are projected to increase by 6 to 11°F** (3.3 to 6.1°C), and winter temperatures have been rising faster than temperatures during other seasons.[15] The frequency of very hot days is increasing. On average, someone in Michigan will experience about **37 extremely hot days in 2050**.[4]

DROUGHT

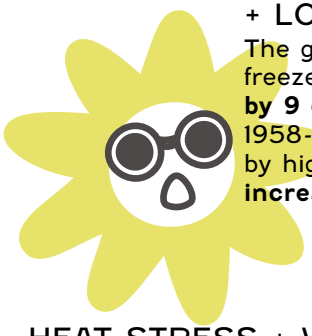
Drought risked is based on **water stress**, a projection of how much of the water supply will be taken up by human demand. While Michigan ranks #36 (of 50 states) for drought risk, **Detroit has about equal availability versus demand on the water supply**. There will be higher water stress for city residents, as well as the urban farmers within the city.[3]

As the climate crisis hastens our transition to hotter envrionments with more extreme weather events, the **sources for life become increasingly more at risk**, namely water and food. Detangling populations from industrial farming may address food security needs in the future, but local agriculture may do more for the environment and their communities than just nourishing them.

This project is an exploration in localized food production, the challenges faced from growing in an urban environment, farmers' concerns regarding climate change, and how urban agriculture (ua) may be a solution to adapting cities to new climates. These considerations are studied through the lens of Detroit and Southeastern Michigan growers.

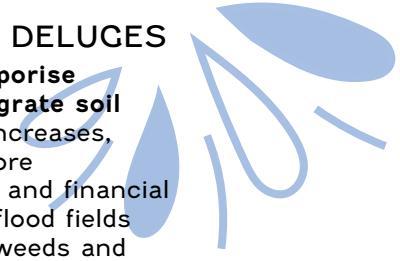
WHAT DOES THIS MEAN FOR FOOD PRODUCTION?

SHORTER WINTERS + LONGER GROWING SEASON



The growing season (period from last winter freeze & following first freeze) has **increased by 9 days in the Midwest**, on average, from 1958-2021. This growing period is projected by high-emissions scenario models to **increase by 1-2 months by 2100**.[15]

HEAT STRESS + WATER DELUGES



Intense heat will **fry crops**, **vaporise moisture from soils**, and **denigrate soil conditions**. As water stress increases, watering crops will become more burdensome on environmental and financial resources. Extreme rains can flood fields and cause fast overgrowth of weeds and invasives.

UNSAFE CONDITIONS FOR FARM WORKERS

Extreme heat, poor air quality, and extreme storms threaten crops and growing conditions, but also make laboring in gardens and farms **high-risk for humans**.

CROP FAILURES + REDUCED YIELDS

A longer growing season has both harmful and beneficial effects. Higher atmospheric CO_2 and longer frost-free periods may increase yields in certain crops, however the **increasingly hot & wet summers will likely reduce yields over time** and flood water-starved fields.[16]

URBAN AGRICULTURE PROVIDES A NUMBER OF SOCIAL, CULTURAL, AND ECOSYSTEM SERVICES, INCLUDING ...

supplying FRESH & LOCAL FOOD and enhancing FOOD SECURITY[7]

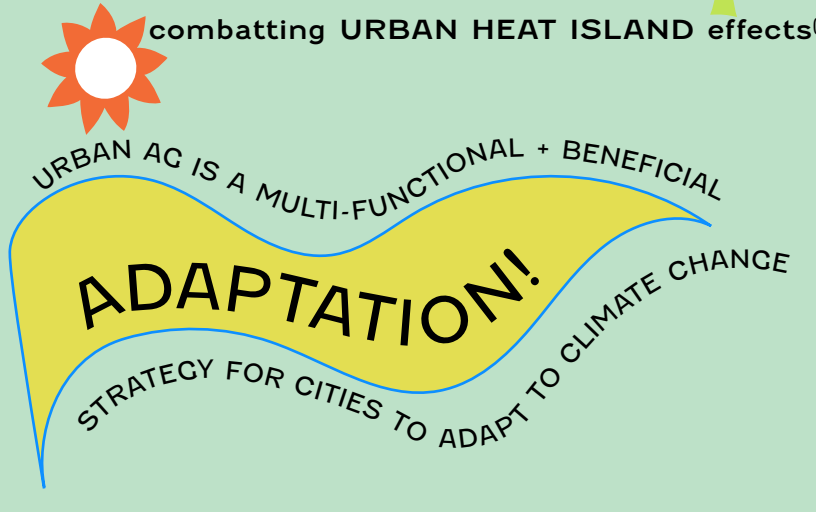
providing PUBLIC HEALTH benefits[14]

reducing EMISSIONS ("food miles") from food transportation[17]

managing and reducing STORMWATER FLOWS[12]

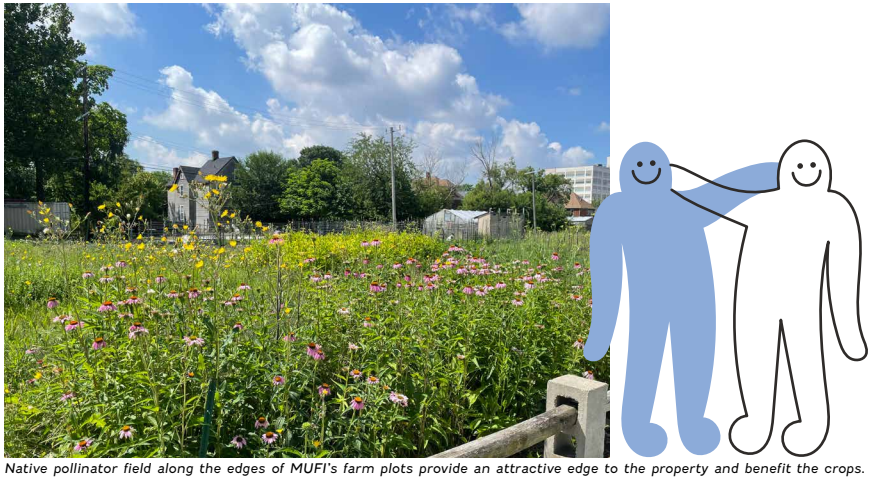
increasing PLANT DIVERSITY & supporting POLLINATOR POPULATIONS[14]

combatting URBAN HEAT ISLAND effects[9]



While an increasing concern, food production is not always ranked as the most important benefit of urban agriculture. In addition to the provision of healthy foods for communities typically under or poorly served by the conventional food system, there are many spillover benefits of urban agriculture.[12]

Community gardens, informal or ephemeral gardens, and shared greenspaces, whether food-producing or not, provide opportunity for **meaningful interactions among residents**, leading to stronger **community cohesion**.[6] A more active and involved community can also increase public safety and wellbeing of residents during extreme weather crises. Beyond adding social value, there are documented cases of **improved mental and nutritional health**.[1]

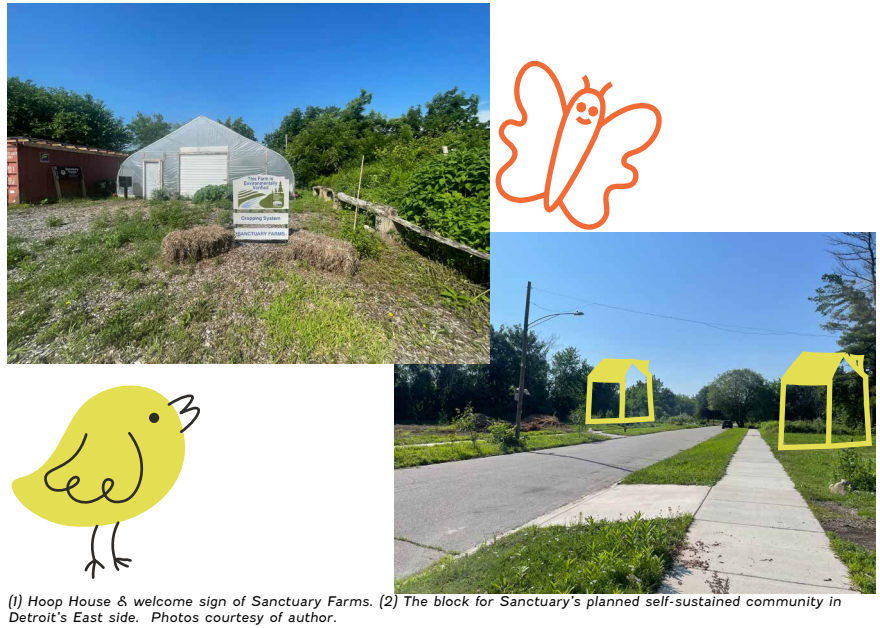


Native pollinator field along the edges of MUFI's farm plots provide an attractive edge to the property and benefit the crops.

In the realm of social psychology, such spaces also make for more attractive and safer neighborhoods. Like in many Rust Belt cities, Detroit has an abundance of vacant land at risk of becoming dumping grounds and other sources of blight. The repurposing of vacant lands into beautiful and productive landscapes adds to the **aesthetic value** of the neighorhood and **discourages further abandonment or crime**.[10] Reuse of existing urban structures and materials also reduces waste and breathes new purpose into abandoned lots. At MUFI, a neighboring demolished home's basement became a water cistern.

In interviews with Detroit farmers (MUFI, Sanctuary Farms), many of their operations began from a desire to **provide an asset to their communities and co-managed third space beyond work and home**. Their communities were underserved by lack of grocery stores or markets that provided quality, organic, and culturally relevant produce. Locally grown produce is more convenient, cost-effective and nutritionally dense. Many of the farms also **provided space and programming to engage the residents** with gardening skills, creative workshops, and community connection.

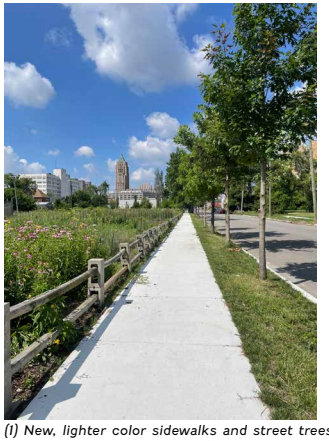
Creating such spaces with community in mind provides opportunity for **greater food literacy** among the urban population, using **gardens as educational tools**[13] as well as e**ngines of economic growth and entrepreneurship**. Sanctuary Farms, in particular, has a vision of developing a self-sustained and planned community that includes the existing farm and future nature preserve. These efforts would fill a gap in the issue of food security, but also address major environmental concerns of **soil health**, **ongoing biodiversity loss**, and **supporting native pollinator and wildlife populations**.



(1) Hoop House & welcome sign of Sanctuary Farms. (2) The block for Sanctuary's planned self-sustained community in Detroit's East side. Photos courtesy of author.

URBAN HEAT ISLAND

The current design and infrastructure of urban areas is not adapted to global warming.[9] Many risks associated with climate change are concentrated in urban areas due to several characteristics of cities - impervious surfaces and heat-absorbing materials, lack of vegetation, motorized traffic and emissions, etc. - that can be summarized in the notion of the **Urban Heat Island (UHI)**. Physical aspects of the urban landscape and anthropogenic heat production create and trap heat, making temperatures of cities consistentently higher than those of surrounding semi-urban and rural areas. **This difference could make cities genuinely uninhabitable in the near future**.[9]



(1) New, lighter color sidewalks and street trees installed around MUFI's farmland. (2) Intact older trees in a community-managed greenspace across from Rising Pheasant Farms. Photos courtesy of the author.

Urban gardens, agricultural lands, street and fruit trees, parks and forests may decrease solar radiation, increase evapotranspiration and consequently **lower temperatures through evapotranspiration and shading**. General vegetation of the city is an elegant, efficient and relatively inexpensive way to address UHI and add aesthetic and social value to public and community spaces.

Plants release water vapor in the air through evapotranspiration, creating a cooling effect within their vicinity. Their ability to absorb and store atmospheric carbon while providing **shade reduces the amount of solar radiation hitting heat-absorbing materials**. A vast and concerted effort to vegetate cities will provide more than just cooler temperatures; as revegetation programs may take the form of community gardens, promenades, parks and green roofs.

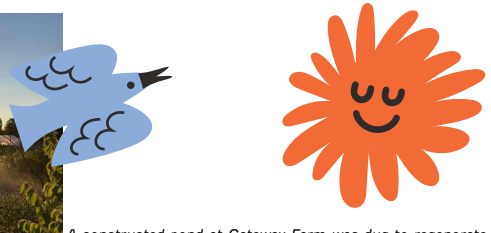
REVEGETATION + BIODIVERSITY

Vegetating the city goes beyond installing street trees and plantings, just as a successful and productive farm or garden needs more than just vegetable plants for harvest. Interplanting beneficial plant species to support pollinators and wildlife provides for these populations, but also aids in the pollination and fruiting of planted crops. Growing organic produce, without harmful sprays or pesticides, requires beneficial insects to predate on pests; weeds can be tamed by planting ground and crop covers rather than leaving bare soil in between rows. The symbiosis of interplanting crop species (basil and tomatoes, corn beans and squash, etc) is an indigenous tactic that benefits each of the plant species, improves soil quality, and is spatially and resourcefully more efficient in a smaller plot.

STORMWATER

Special consideration should be given to stormwater management for the city of Detroit. The **city faces significant flood risk**[3] and has flooded 4 times since 2016.[5] The runoff rates of agricultural, pasture, prairie or woodland are much lower than that of typical impervious surfaces of the city: sidewalks, asphalt, and roofs. Allowing more water to infiltrate into the ground will alleviate stormwater infrastructure currently designed into cities.

Agricultural practice within a city reduces the amount of impervious surface and turf lawn, allowing for **more water infiltration into the soil**. The addition of rainwater harvesting, stormwater reclamation, and water re-use by farms and gardens preserves this resource to water their crops in times of heat and drought, as well as reducing environmental costs associated with stormwater processing. The linkage of UA to green infrastructure planning must be recognized for a multi-functional benefit.[12]



A constructed pond at Gateway Farm was dug to regenerate the soils and add stormwater drainage for the fields. An edible food forest surrounds this new habitat for amphibians and waterfowl, creating a sanctuary for humans and wildlife. Photo courtesy of Gateway Farm.

CONCLUSION

Cities and urban areas face an incredible challenge in the coming years. Urban populations across the globe will grow, from 55% of global populations living in cities to 68% by 2050, according to the UN.[16] **With population growth comes strains on housing, infrastructure, resources, and the social safety net**.

City planners, local governments, and residents must prepare for an uncertain future climate and **think creatively to reach solutions**. As our current infrastructure continues to fail, new strategies must be implemented that serve mutiple functions. Growing food locally provides innovative, ecological solutions to stormwater management, protects from extreme heat, and adds redundancy to our food procurement systems. **To have a farm or garden within every neighborhood means communities have connections with and resources for the coming future**.

(1) A greenhouse at Rising Pheasant Farms is nestled among native plants and re-establishing forest. (2) A bountiful harvest of organic garlic, grown by Rising Pheasant Farms. Photos courtesy of author.

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