LORC 活動報告①

The Role of Universities in the Regeneration of Depopulating Cities

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Over time, all cities experience periods of population growth and decline. However, some cities struggle with persistent, long-term population loss and this condition poses a distinct set of challenges and opportunities. This paper will explore various responses to population decline in US cities and discuss the role of universities in helping to craft these responses.

BACKGROUND

Depopulation has occurred in numerous cities across the United States, but this condition is primarily concentrated in the older industrial cities of the Midwestern and Northeastern regions of the country. Beginning in the 1970s, the inter-related processes of industrial restructuring and globalization have led to economic decline and population loss in many cities. The well-documented migration of people from the "Rustbelt" in the Midwestern region of the U.S. to the "Sunbelt" in the Southern and Southwestern parts of the country has amplified the challenges faced by depopulating cities[i].

Many depopulating cities in the US are concentrated around the Great Lakes, the largest group of fresh water lakes on the planet, containing 21% of the world's surface fresh water by volume. The Great Lakes played a central role in the early development of many Midwestern cities, allowing for industrial production, efficient shipping, economic expansion, and rapid population growth in the 19th and early 20th centuries.

The Great Lakes and their underlying ecosystems were damaged by the processes of urban growth and industrialization, when growth and production took precedence over the protection of natural systems and fresh water resources. In the current era of depopulation through much of the Great Lakes region, new opportunities for the restoration of Great Lakes ecosystems have begun to emerge in the form of more sustainable land use practices, better stewardship of natural resources, and a heightened focus on climate resilience.

CHALLENGES OF DEPOPULATION

Depopulation creates significant challenges older industrial cities in the US. Three predominant physical challenges include vacancy/blight; surplus infrastructure; and climate-related vulnerabilities.

Vacancy and blight: As a city's population declines, buildings are abandoned and often demolished. For example, Cleveland, Ohio, a city situated on Lake Erie, has approximately 23,000 vacant parcels of land within city limits. This is equivalent to 14% of the city's overall land area[ii]. 12,000 of these vacant lots are held in municipal and county land banks. Excess real estate drains value and vitality from city neighborhoods, as

Image 1 : Vacant parcels in Cleveland, Ohio



empty buildings and vacant land often lead to further disinvestment and blight.

Blighted conditions will often motivate current residents to move to more stable areas, typically in suburban jurisdictions. The result is a hollowing out of the urban core, leaving behind the poorest and most vulnerable populations, including the elderly residents and single-parent households who often lack the resources needed to leave. The most prevalent image of a blighted and depopulated city is Detroit, Michigan, a Great Lakes city that represents a common, if over-simplified perception of the post-industrial urban condition.

Surplus infrastructure: In cities that have lost substantial population, the capacity of existing infrastructure often exceeds demand. For example, in Cleveland the road and sewer network was designed for a city of one million people. The city's current population is 390,000. Although there are far fewer people and less tax revenue available to maintain this infrastructure network, decommissioning infrastructure is not a high priority in Cleveland for a variety of reasons. First, engineers and public works professionals are trained to maintain and expand infrastructure networks. The idea of removing infrastructure is contrary to the way they operate. Generally speaking, public officials prefer to incur the costs of maintaining the entire infrastructure network at some minimal level, even if it far exceeds current needs, rather than risk removing infrastructure that may have to be reinstated at some point in the future.

The issue is further complicated by the expense and physical difficulties associated with decommissioning infrastructure. There are significant capital costs involved in removing roads, sewers, and water lines. Public officials are hesitant to spend capital funds in the present to achieve a possible (but

uncertain) maintenance cost savings in the future. Compounding their resistance is the fact that the future is unknown. The City of Cleveland, for example, has significant assets that point toward long-term growth and recovery. Surplus capacity-particularly in water, energy, and transportation infrastructure-is a competitive advantage that can be used to attract businesses and economic development to the city. Eliminating this surplus now could prove counter-productive over the long term.

There are also physical constraints to downsizing infrastructure networks. Utilities, rail lines, and roadways operate on a fixed grid. It is difficult to remove components in depopulated areas without impacting the whole system. Water, sewers, roads, and power lines need to extend through depopulated areas in order to get to areas of a city or region where concentrations of people still live and work. And when cities are dealing with old infrastructure, redundancy is a benefit. When bridges fail, water and sewer lines break, and pumping stations need to come offline for maintenance, redundant aspects of an infrastructure network provide a back-up that enables a city to continue to meet the needs of residents and businesses in these emergency situations[iii].

Climate-related vulnerabilities: Adapting to the effects of climate change will require specific interventions that respond to the unique challenges facing depopulating cities. In Cleveland, concentrations of elderly and impoverished residents make certain neighborhoods especially vulnerable to the adverse impacts of climate change. Although climate vulnerability in the US is most commonly associated with sea level rise experienced in coastal cities, the inland cities of the Great Lakes region are also being impacted by climate change. Cleveland is experiencing increased flooding risks and storms of greater frequency and intensity. Also, extended periods of high heat lead to measurable increases in heat-related mortality, particularly for households that lack access to air conditioning. Rising energy costs and anticipated energy shortages will also affect the most vulnerable households in depopulating cities to a greater extent than more affluent households in stable and growing cities.

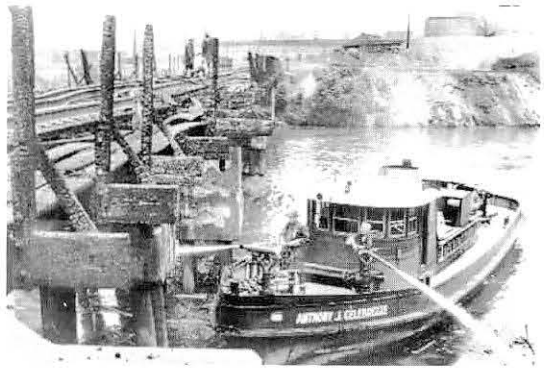
Depopulating cities have a greater responsibility to respond to social conditions and land use patterns that exacerbate the adverse effects of climate change, particularly in low-income neighborhoods and communities of color. New projects, programs, policies, engagement strategies, and research are needed to lessen overall demand for energy, anticipate and prepare for climate changes and shocks, and foster social cohesion in these cities.

EMERGING OPPORTUNITIES IN DEPOPULATING CITIES

The primary opportunity inherent in a depopulating city is that of reinvention. Population loss, vacancy, and surplus real estate and infrastructure provide the basis for new patterns of urban development that are more equitable, sustainable, and resilient.

Vacant Properties as Hydrological Assets: Water shaped the earliest land use and settlement patterns of Great Lakes cities. But the rivers and tributaries that sustain the Great Lakes have long been disregarded and abused in these very same cities. For over 100 years, Cleveland has turned its back on Lake Erie. The city is cut off from its lakefront by highways, rail lines, and a little-used lakefront airport. The Cuyahoga River, which runs through the heart of the city, received even

Image 2 : Extinguishing the 1969 Cuyahoga River fire (*Cleveland Memory Project*)



rougher treatment, functioning as a sewer for riverfront industries and catching fire nine times (most infamously in 1969) due to an abundance of oil and debris in the river.

The Cuyahoga River no longer burns in Cleveland, and efforts are underway to promote development and provide public access to the city's river and lakefronts. However, an aging combined sewer system continues to discharge a mixture of estorm-water and untreated sewage at 126 outfall locations. The Northeast Ohio Regional Sewer District (NEORSD) is responding to the combined sewer overflow problem with a $3 billion plan to construct seven large interceptors that will catch and hold runoff during heavy rainstorms. NEORSD is also taking tentative steps toward incorporating green infrastructure into plans for controlling combined sewer overflows, which may begin to express aspects of Cleveland's hydrological identify.

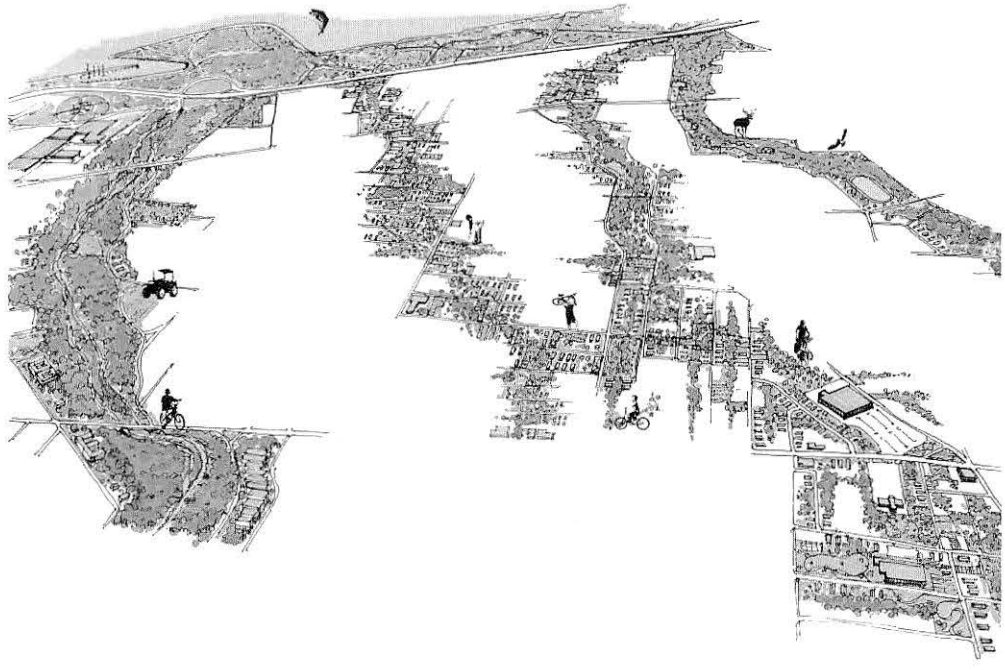
Urban greening strategies for vacant land can help to expand and restore the city's tree canopy. Although Cleveland's nickname is "The Forest City," the tree canopy within city limits has been largely depleted, declining from about 50 percent canopy coverage in the 1950s to a meager 19 percent in 2014[iv] . Reforestation is a visible and effective measure for restoring balance in the urban water cycle. The city's growing inventory of vacant land provides an underutilized opportunity to restore the kinds of vegetation that Lake Erie and its tributaries need for optimal health and function.

In some of the most depopulated parts of the city, vacant parcels can be aggregated into larger development sites and ecologically productive green spaces. Approximately half of the vacant parcels in Cleveland are currently in the public domain (city and county land banks). This high percentage of public ownership could provide the basis for a more progressive approach to land-use decision-making. Using the principles espoused by landscape architect Ian McHarg in the late 1960s, the city could begin to make strategic decisions about where to rebuild (and, more importantly, where not to rebuild) based on hydrological outcomes.

In Cleveland, many tributaries of Lake Erie and the Cuyahoga River were buried in culverts during past decades when growth pressures led to an erasure of indigenous waterways. In the present climate of weak development demand, there is an opportunity to restore regional watersheds by assembling vacant sites that align with buried waterways and to limit future development along these alignments.

From an ecological perspective, it was never a good idea to bury streams within culverts and build on top of them. As the number of parcels in city and county land banks continues to grow, sites that coincide with buried waterways could be set aside as permanent green space. In some cases, these sites could be used for stream restoration. However, restoring (or "daylighting") streams is a vastly expensive proposition. As such, it is unlikely that all of Cleveland's culvert waterways will ever be restored to a wholly natural condition. But it may be possible to assemble vacant properties along

Image 3 : Concept for assembling vacant land into natural greenways to restore hydrological processes in city neighborhoods.



the actual (or approximate) paths of the buried creeks and streams, and re-establish riparian landscapes on these properties. Natural greenways above culverted streams allow for new bike and pedestrian connections, resulting in a more coherent and accessible green space network within the city, with links to the suburbs and the region.

Infrastructure Adaptation: Depopulating cities present long term opportunities for more efficient and sustainable infrastructure management practices in the following areas :

Coordination across Infrastructures: Depopulating cities can explore whether changing practices in one infrastructure management sector may yield costs savings or efficiency improvements in other sectors. For example, while the cost savings accruing to highway departments from decommissioning roads may be minimal, it is possible that removing large quantities of pavement in depopulated areas could yield hydrological benefits that reduce stormwater management costs. Similarly, greater reliance on public transportation may yield substantial reductions in overall energy use and demand. And, if water and wastewater management systems can be simplified and unnecessary service extensions minimized, it is possible that this may reduce long term energy costs.

Smart Technologies: In the electricity sector, advanced metering methods may enable both decentralized energy production from renewable sources and the creation of information that allows residents and businesses to understand how their behaviors influence the amount and cost of electricity they use. In the transportation sector, new technologies may enable both faster and more efficient reports about congestion and traffic patterns that can yield more efficient time management for travelers, along with reduced costs and environmental benefits. In the water and wastewater sectors, new technologies may allow for better and less costly leak detection processes for water systems, and automated systems for predicting failures in levees and for monitoring water quality. These technologies have the potential to be useful in all cities, declining and growing. But

Image 4 : Water-responsive development concept for Cleveland's Opportunity Corridor



opportunities for the early adoption of these technologies are especially important in depopulating cities, where efficient infrastructure delivery is a more urgent issue.

Harnessing Vacant Lands for Renewable Energy and Stormwater Management: Cities are becoming increasingly aware of the need to reduce their reliance on fossil fuels. Unfortunately, existing infrastructure in many US cities is not well suited to this task. The electrical grid is not structured to draw energy from a wide range of sources and many alternative energy sources such as solar power require significant land area to produce power in sufficient quantities. With an abundance of vacant land and declining property values, depopulating cities may hold unusual potential for developing alternative and decentralized energy sources. As federal and state governments invest in projects to expand the proportion of energy demands that are met by alternative sources, depopulating cities may find that they have a comparative advantage in this area.

Emerging practices in distributed stormwater management and green infrastructure also offer significant opportunities for depopulating cities. Green infrastructure is the use of green spaces, wetlands, parks, forest areas, and native vegetation to manage stormwater naturally, reduce flooding risk, and improve water quality. Green infrastructure can support conventional centralized sewer systems by reducing the amount of stormwater that ends up in the sewer system. These practices are increasingly being used in cities across the US. As with the generation of renewable energy, abundant vacant land and relatively low land costs may give depopulating cities an advantage in terms of implementing green infrastructure practices at a citywide scale.

Understanding the Costs of Unguided Growth: Per capita infrastructure service costs are likely to be higher in depopulating cities than in cities that are more densely populated. Sprawling patterns of growth in metropolitan regions contribute to both declining populations in central cities and to increasing infrastructure costs. Over the long term, assessing the costs associated with declining central cities within sprawling regions is essential in order to inform both planning and political processes affecting

metropolitan growth.

Climate Resilience: Vacant properties in a depopulated city can be used for green space expansion, storm water management, reforestation, and other strategies that help improve climate resilience by reducing the risks of flooding and mitigating urban heat island effects. However, a depopulating city needs a comprehensive land use approach to enable city officials and residents to make climate-responsive choices about where to target new development and where to create green spaces and green infrastructure that will buffer residents from the adverse impacts of climate change. A robust community engagement process is essential, in which residents initiate and guide climate-related actions to address community concerns and foster social cohesion. For depopulating cities to take advantage of the climate-based opportunities inherent in urban vacancy, there needs to be strong community leadership, grounded in innovative climate science and best practices for planning and urban design.

THE ROLE OF UNIVERSITIES IN URBAN REGENERATION

A typical role for universities is to conduct research that documents the range and extent of problems faced by depopulating cities. In Cleveland, an example of this is the Urban Long Term Research Area Exploratory program (ULTRA-Ex) through which a team of scientists and planners from Cleveland State University, Ohio State University, and Kent State University studied the ecosystem services provided by vacant urban land. The ULTRA Ex initiative produced a Vacant Land Rapid Assessment Tool to help municipal land banks make more informed decisions about the disposition of vacant parcels in their inventories[v].

Academic research can also be conducted to measure the impacts of programs intended to address the challenges of depopulating cities. For example, landscape improvements and community gardens on vacant sites in depopulating cities can help to address urban heat island effects, but the extent of these impacts are not yet well understood[vi]. Other research questions being raised related to climate resilience efforts in Cleveland include:

- For stormwater infiltration on multiple vacant sites, how many sites, and in what configuration, are needed to achieve significant, measurable improvements in water quality ?
- How do climate conditions vary between different Cleveland neighborhoods, based on levels of depopulation and patterns of urban density ? Installing weather stations in neighborhoods throughout Cleveland would help to document variations in urban heat island effects and enable more targeted strategies for heat emergencies and stormwater management over the long-term.
- Which programs and investments will have the greatest impact on the city's most vulnerable populations ?
- How do vacant land pilot programs and projects scale up for neighborhood and city-wide impact ? And which are most replicable in other cities ?
- Which elements of the city's infrastructure networks are most vulnerable in the event of various climate emergencies ?

Beyond the boundaries of traditional academic research, universities can also serve as partners in, and advocates for urban change. Faculty and students can play an important role, if they choose to do so, in

challenging existing assumptions, advocating for higher standards of urban design and development, and supporting a more informed public process. Perhaps the most important role of the university is to be a persistent and vocal advocate for improving the quality of the public realm and addressing the needs of people who are too often left out of political processes that directly affect them.

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