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Understanding Small Town Sprawl Using GIS

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Introduction
➢ The literature is rich in information on sprawl mitigation strategies
➢ One size does not fit all and while an edge effect might work in one city, downtown revitalization might work better in another
➢ Much of the emphasis placed on urban sprawl related to large cities
➢ Limited attention given to sprawl mitigation strategies in rural small towns
➢ Using the city of Florence, Alabama as case study, we examined infill development and the use of brownfield redevelopment as a mitigation strategy in a small rural town.

Study Site
➢ 50 miles from Huntsville, Alabama
➢ 100 miles from Birmingham, Alabama
➢ 105 miles from Nashville, Tennessee
➢ On north shore of the Tennessee River
➢ The largest and principle city of the Florence-Muscle Shoals Metropolitan Statistical Area)
➢ Part of a cluster of four communities (Muscle Shoals, Sheffield, and Tuscumbia)
➢ Referred to regionally as the Shoals
➢ City currently covers 26.30 sq. miles
➢ Most current development occurring on northern and eastern city edges
➢ Metro area of over 147,000 (U.S. Census Bureau 2017)
➢ Population size and location of the City of Florence correctly fit the small rural town designation used throughout this study.

Literature Review
➢ Small towns frequently do not have the resources to plan for and control urban sprawl the same way that cities do (van Rensburg and Campbell 2012; Galster et al. 2001).
➢ Sprawl mitigation strategies identified in the literature include:
   ➢ A Smart Growth planning strategies which aims to concentrate development in urbanized areas by clustering developments near existing infrastructure or in central places (Greenberg et al. 2001)
   ➢ Infilling by developing existing greenfields and redeveloping brownfields (Cao and Guan 2007, Greenberg et al. 2001, Habibi and Asadi 2011).
   ➢ Investment in and changes to transportation policy at the regional government level (Greenberg et al. 2001)
   ➢ Urban design: compact building design, mixed land use development, walkable neighborhoods (Cornelius 2009)
   ➢ Urban edge strategy/urban growth boundary (Brueckner 2000, Johnson 2001, van Rensburg and Campbell 2012)
➢ While the literature is rich in identifying causes, impacts, and sprawl mitigation strategies, assessment of some of the mitigation techniques using modern geospatial technologies is limited.
➢ Regardless of its character, urban sprawl occurs in both large city and small rural town settings but its effects are felt differently.

Overarching Question
Are infill development and redevelopment of brownfields effective urban sprawl mitigation strategies in small town settings?
➢ Would the use of infill development have significantly impacted the amount of land annexed by the city of Florence between 1987 and 2014?
➢ How can GIS help identify and classify brownfields as an urban sprawl mitigation strategy?

Data & Methods
➢ Geospatial data are obtained from various sources (see later) and assembled in an ArcGIS 10.6 Desktop environment.
➢ Base map for the City of Florence is created.
➢ Both base map and land use map are used to identify infill development, green fields, brown fields, undeveloped land, undeveloped land.
➢ Various GIS functionalities are used to identify and analyze the data in a geographic context as shown below.

Study Findings
GI analysis determined that:
➢ 1,405 acres of developed land were annexed into the city of Florence between 1987 and 2014
➢ 55% of total annexed land is zoned residential R-1 or R-2
➢ About 192 acres of greenfields & 35 acres brownfields available for development/development (which is just over 1% of total parcels within city of Florence boundary)
➢ Significantly more land was annexed (1,405 acres) than is currently available (227 acres) for development

Discussion & Proposed Future Research
➢ 55% of annexed land is zoned residential (R-1 or R-2) indicating that more than half of sprawl is related to residential development.
➢ A comparison of annexed land (1,405 acres) to land available for development (227 acres) indicates a significant difference in area. Even if all available land had been developed, it would only have addressed 16% of the sprawl.
➢ Although development of brownfields and greenfields would slow the rate of urban sprawl, it is not enough to eliminate it entirely.
➢ We suggest a combination of sprawl mitigation methods be used to combat urban sprawl in a small rural town like Florence, AL.

Data Gaps
Finding accurate historical geospatial data for the city limits for the city of Florence turned out to be problematic. Contacts at the city of Florence were unaware of any such data prior to 2000 existing. As a result, a boundary was created using heads-up digitizing.

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Literature Cited