Using GIS Technology to Assess the Prudence of Municipal Growth through Annexation

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1. INTRODUCTION

Fiscal and policy analysis models are beginning to be used more frequently by local governments in an effort to insure that decisions about growth and service delivery are ones that can meet the test of fiscal responsibility. Our poster will describe the development of a GIS-based fiscal and policy analysis model and application for a U.S. city that has adopted a set of annexation policies to guide further growth through the incorporation of nearby properties. The model and application were designed so as to allow municipal managers and elected officials to understand the degree to which specific annexation proposals would be fiscally viable and would follow the policy guidelines for appropriate annexation that were adopted by the city.

The model is based on an understanding of how the various components of revenue generation and expenditure responsibilities interact. The behavior of the model arises from the stocks, flows, responsibilities, and capacity surpluses that are identified in the initial condition as well as from a set of feedback loops and algorithms that govern the expected flow of revenue and expenditures in the post-annexation situation [1]. For example, growth in population or the stock of new businesses can generate positive revenue-generating feedback loops.

The proposed poster would have 6 sections. Section 1 would describe the purpose of the model and application and outline its structure. Section 2 would identify the issues that the model was designed to address. Section 3 would describe the applications and its technical components while Section 4 would present the methods for using the application within the departmental workflows and the requirements for user input. Section 5 would present example computational formulas for identifying major fiscal impacts, and the final section would sketch recommendations for further development.

2. BACKGROUND AND PROBLEM

To address local government revenue shortfalls, some municipalities will attempt to raise property taxes and user fees. Other municipalities, however, believe that they can reduce fiscal stress through growth. While cities may naturally grow their populations over the course of decades, an even faster rate of growth can be achieved through annexation of unincorporated property.

While annexation can represent a justifiable response to fiscal stress, the rationale and benefits of annexation are thought to be even broader. For example, judiciously considered annexations are sometimes used to accommodate or control urban sprawl, to provide for better land management and environmental protection, to simulate greater economic development, and to allow nearby residents to receive municipal services without the county government duplicating the service capabilities of the city [2].

At the same time, specific annexations are also not without their disadvantages and complications. Some residents, believing that the added taxes will be greater than the added service benefits, may not want to be annexed. Similarly, county governments may resist annexations because of their potential to undermine their revenue base. Likewise, the desirability of the annexation may depend on the wealth and demographics of the annexation area or the quality of the respective school systems, police departments, or other services in the city vis a vis the county. Perhaps most importantly, while city leaders may expect annexation to help reduce fiscal stress, in some cases annexation can radically increase such stress. For example, a small city in south Georgia, was asked by the local school system to annex an area where the school system planned to build a new high school. This area was a couple of miles from the existing city boundary. The school system would benefit from the annexation because it would be able to receive water and sewer services that were not available in that area. Without the water and sewer services the school system would not have been able to build the school in that area, and would have likely paid a higher price for similar land. Unfortunately for the city, however, the decision to annex the area in question resulted in much higher expenditures (for water and sewer and police services in particular) without also resulting in higher revenues. Because no fiscal analysis was conducted, the city made a very poor decision that has had long-term negative fiscal consequences as well as important opportunity costs (e.g., because the annexation required infrastructure investment in the northern part of the city, the city was unable to make a similar investment in the southern area of the city that has experienced the most growth and that could have provided for even greater economic growth were such investments made).

Changes caused by annexation are often difficult to identify because of the large number of stakeholders involved. Changes that may benefit a city, may harm a school system. Changes that benefit landowners in the annexation area may disadvantage residents in that area that have school age children. Changes that help result in lower per unit costs for a city may result in higher per unit costs for the county, and so forth. When the Carl Vinson Institute of Government (CVIOG) reviewed the fiscal impact analyses of annexation proposals that they had conducted between 1981 and 1999, they discovered that the conventional wisdom about annexations always resulting in fiscal gains for cities was not supported. In fact, they found that such positive fiscal change only occurred in 3 of the 8 cases of annexation that were studied.

Research on the variety of state laws governing annexation indicates that most states make some attempt to balance some of the conflicting interests. For example, some states have begun to integrate their annexation policies with the larger land-use policy framework or their efforts to manage growth. States such as Georgia, for example, implicitly help communities plan for

annexations by requiring cities and counties to jointly specify their service delivery plans so as to avoid duplication and to improve efficiency.

While state law may govern the ability of cities to annex new land, the wisdom of such annexations is typically an issue of local concern. In this regard, the use of fiscal impact analysis to measure the reasonableness of the annexation would is highly recommended. Fiscal impact analysis in this instance is defined as the projection of the direct and indirect costs and revenues associated with growth (in residences, businesses, or vacant land). The individual circumstance of local revenue sources and expenditure responsibilities can severely tilt the fiscal impact balance in one direction or the other.

Unfortunately, conducting fiscal impact analyses can itself represent a fiscal burden. The cost of conducting such analyses can range from a few thousand dollars to tens of thousands of dollars, depending on the complexity of the task and the availability of in-house expertise.

3. CONCLUSIONS

Given the combination of the importance of fiscal and policy impact analyses in the annexation process and the relatively high cost of these analyses, the challenge for the authors was to create an ***Automated Annexation Analysis System*** **(AAA)** that could provide city managers and officials with the ability to conduct fiscal impact analyses at a minimum of cost and effort. The opportunity to create such a system came when the City of Decatur identified the need for a number of annexation-related fiscal impact analyses. CVIOG faculty responded to this need with a proposal to create a GIS-based application that could provide fiscal impact analysis of any proposed annexation. However, because the City of Decatur had developed a set of annexation policies, the proposed analysis system would also need to address a number of issues that go beyond the standard fiscal impact concerns to identify potential impacts on reaching policy goals such as minimizing environmental and school enrollment impacts and enhancing livable neighborhoods. Because annexation at its heart represents an instance of a land-use choice, the advantages of a GIS-based application for the proposed system were considerable [3].

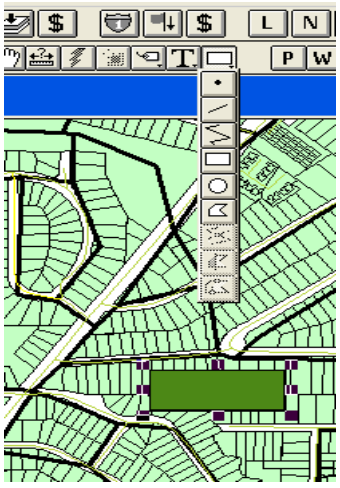

Figure 1

To operate the system the AAA user first provides the system with revenues source data on tax and fee rates, and tax exemptions and credits as well as unit-based departmental expenditure rates (e.g., $ per household or business or street mile or acre). Then the user draws on a digital map an area of interest (see Figure 1). Using geoprocessing components, the system translates the digital drawing into specific data sets of parcel, building, zoning, household, business, census and expected crime rate information. Algorithms developed from a study of current relationships between these data and city revenues and expenditures are then employed to relate these annexation study area data to future expected revenues, expenditures, insurance rate changes, school enrollment and annexation-polices (see Tables 1-3).

Table1: Sample Revenues Generated from an Annexation Study Area

Source	Estimated Amt. from ASA
Motor Vehicle Tax Revenue:	$ 202
Real Property Tax Revenue :	$ 45,897
Personal Property Tax Revenue:	$ 10,637
Other Property Tax Revenue:	$ 1,546
Total Phone Franchise Fee Revenue	$ 761
E911 Revenue :	$ 74
Cable Franchise Fee Revenue:	$ 0
Gas Franchise Fee Revenue:	$ 239
Insurance Premium Revenue:	$ 0
Electricity Franchise Fee Revenue:	$ 3,460
Business License Revenue:	$ 5,939
Alcohol License Revenue:	$ 0
TOTAL ESTIMATED GAINS	$ 68,905

Table 2: Sample Departmental Expenditures

Department	Estimated Expenditures
Building Inspections :	$ 236
Public Works :	$ 10,266
Police Fixed Patrol:	$ 4,000
Police Business Patrol:	$ 9,558
Police Residence-Associated Costs:	$ 432

Table 3: Sample City of Decatur's Annexation Policies

Land Use Review:	Does the ASA development meet the Best Land Use Management Practices?
Environmental Hazards:	Does the area include known environmental hazards such as abandoned underground fuel tanks?

4. REFERENCES

[1] Sterman, J.D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: McGraw-Hill, 2000.

[2] Steinbauer, P., Hudson, B., Hayes, H. and Facer, R. An Assessment of Municipal Annexation in Georgia and the United States. Carl Vinson Institute of Government, Athens, GA, 2002.

[3] O'Looney, J. *Beyond Maps: Geographic Information Systems and Local Government Decision Making.* ESRI Press, Redmond, CA, 2000.