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Modeling Parks and Tacoma Neighborhood Council Capital Improvements

Abstract:

Neighborhood councils work interactively with citizens to choose capital improvements. The cost of the improvements is totaled as they are placed on the map. In 3D, new improvements such as street trees or bus shelters are shown as they would look in a realistic neighborhood scene.

Park service areas that vary depending on park amenities are compared to the existing population and 20-year projections. Indicator data showing population served are displayed in dynamic charts and a linked 3D view of underserved areas.

Both applications use CommunityViz™ ArcView extension software from the Orton Family Foundation.

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Introduction

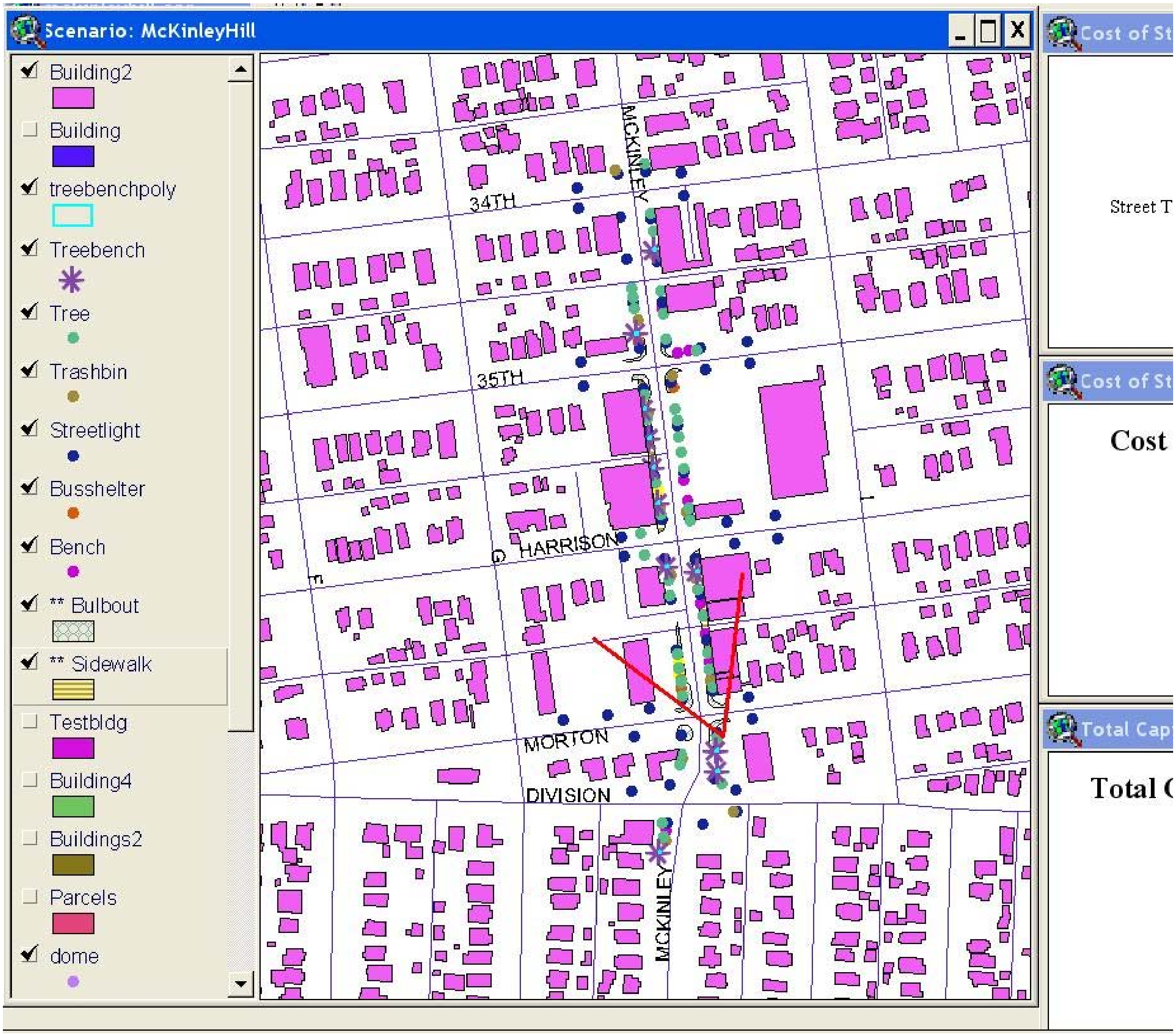
The City of Tacoma was chosen to be one of twenty-two sites for the limited release of CommunityViz™ software. The software tools help the community and planners to evaluate and visualize planned development. An ArcView extension which will be ported to ArcGIS, the components of CommunityViz™ are closely integrated with GIS data. For more information on the software see www.communityviz.com. The software is a product of the Orton Family Foundation (see www.orton.org).

Tacoma Neighborhood Council Capital Improvements

In Tacoma, Neighborhood Community Councils oversee the expenditure of neighborhood capital facility budgets. Citizens choose which facilities, such as sidewalks, streetlights, street trees, benches, bus shelters, etc., are the most needed for their area. To assist them in the prioritization process, a very simple CommunityViz™ scenario was set up for the McKinley Hill business district. The steps for using the scenario are:

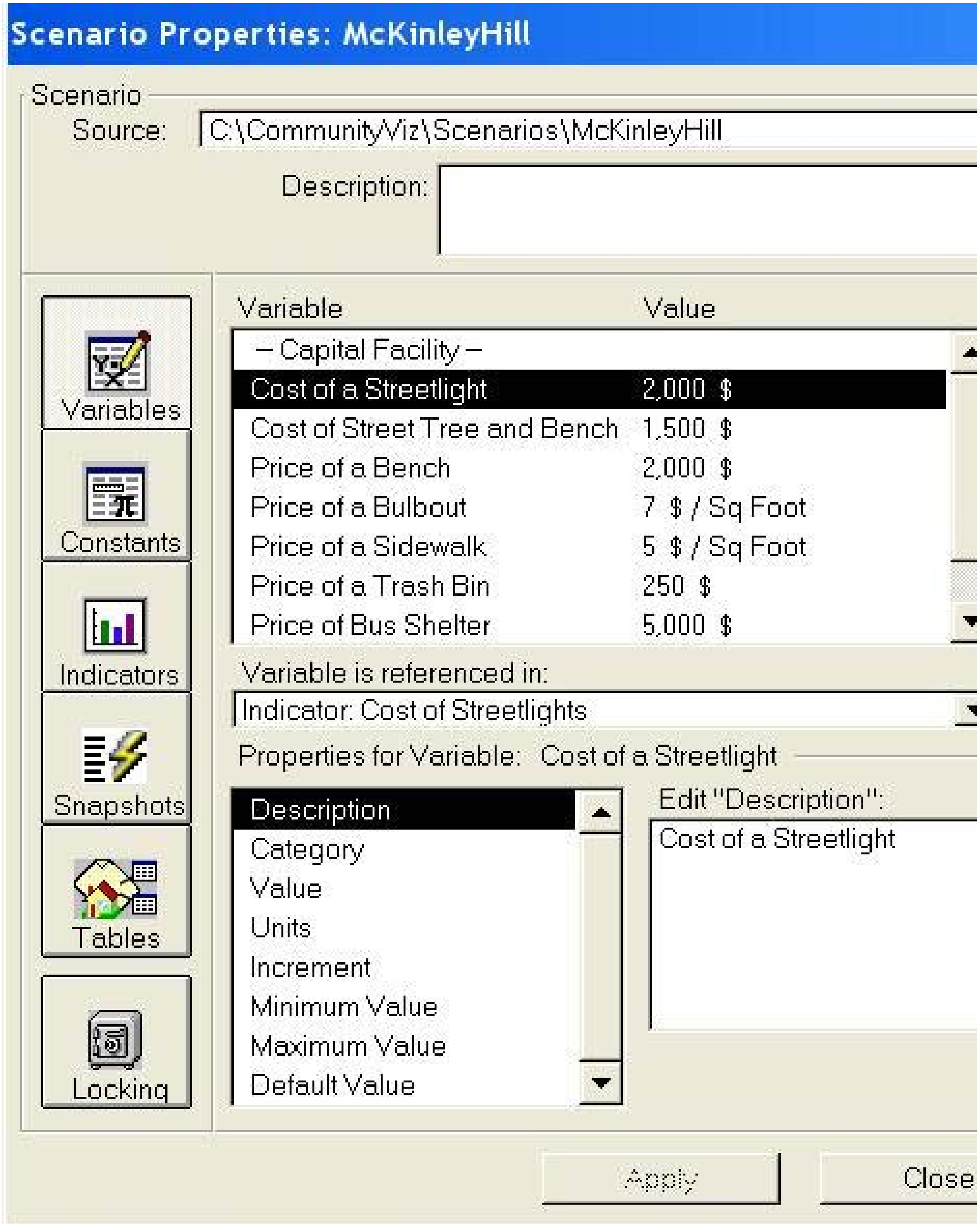
- Add the facilities to the 2D map.
- Compare the costs to the budgeted target values while adding the facilities.
- View the impact of the improvements in 3D interactively.

Setting up this scenario took a day and a half for the prototype, using non-customized buildings and objects from the software library. That time included interviewing the planner to establish the project objectives. Following is the 2D map with 2D facility locations and some of the facility indicators.

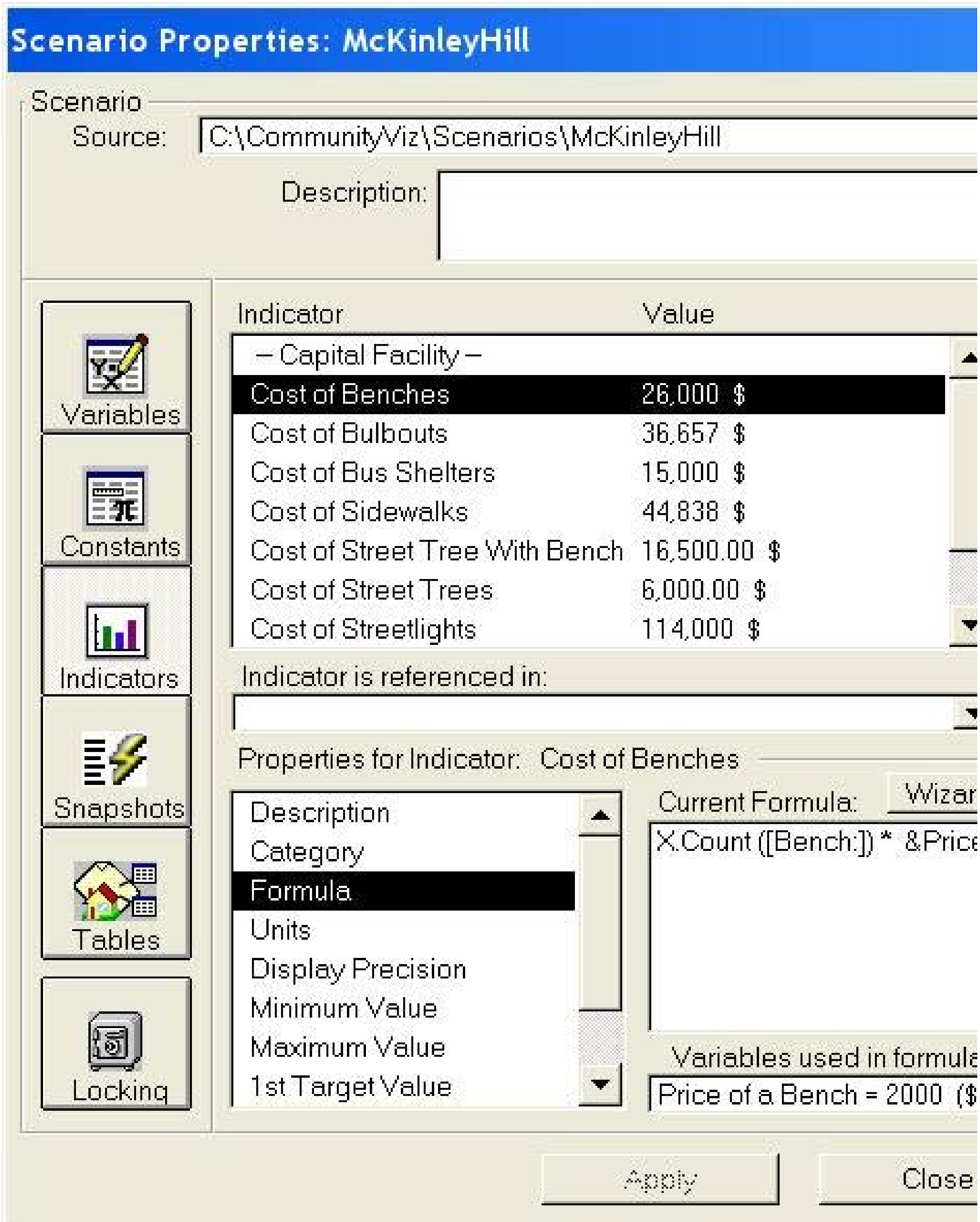


The community facilities for McKinley Hill included street trees, street trees with benches, bus shelters, street lights, sidewalks, sidewalk bulbouts, and benches. Indicators, displayed as bar charts, were created for each individual facility plus a total capital facility expenditure indicator chart. Three of those indicators are shown here.

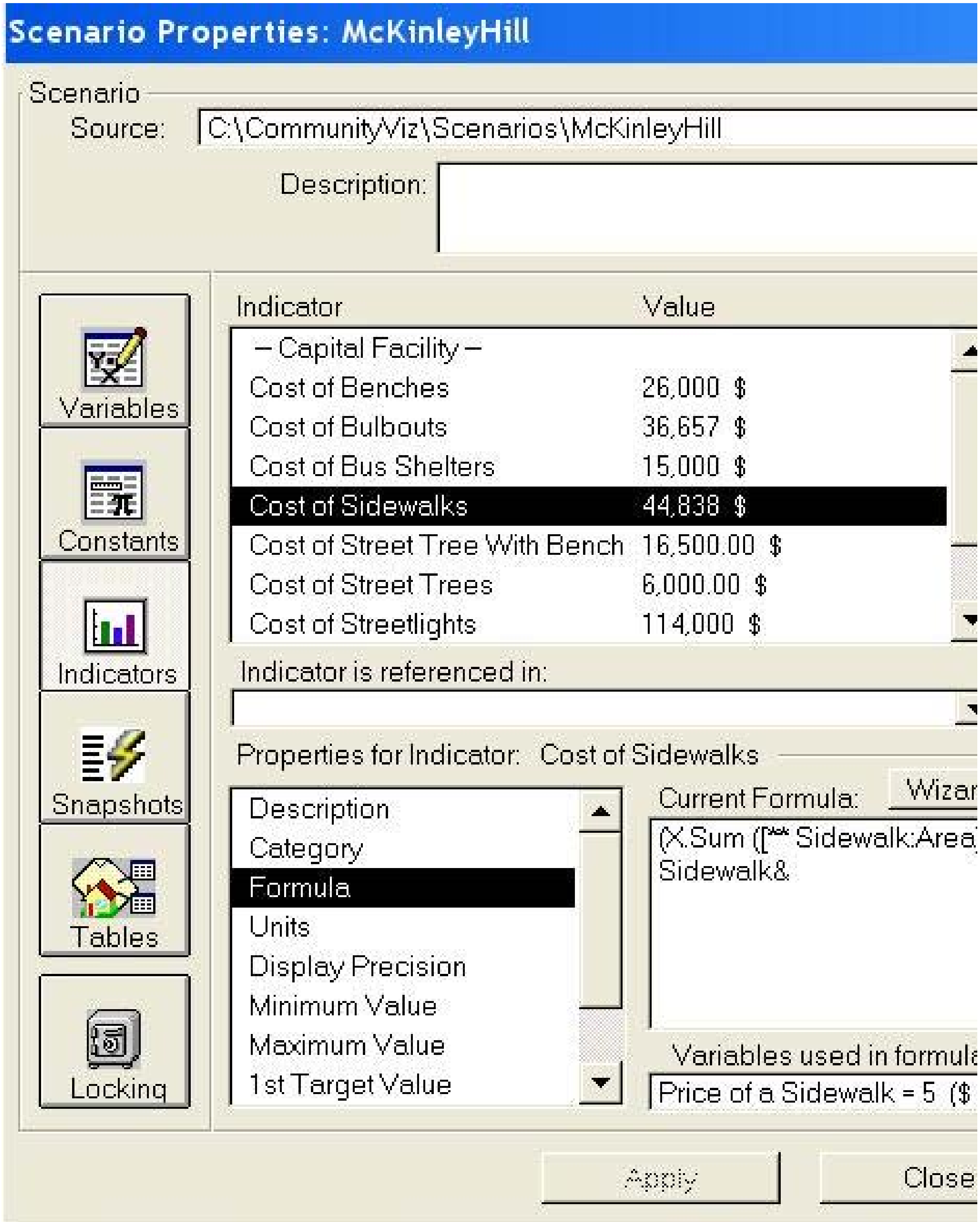
The first step for setting up the indicators are to define variables for the cost of each kind of amenity. These are quick to change with a slider bar or just updating from the scenario properties window. If the price of a facility is changed, the related indicators are updated automatically. Note that the scenario properties window provides an opportunity to enter metadata about variables, formulas, and the scenario in general.



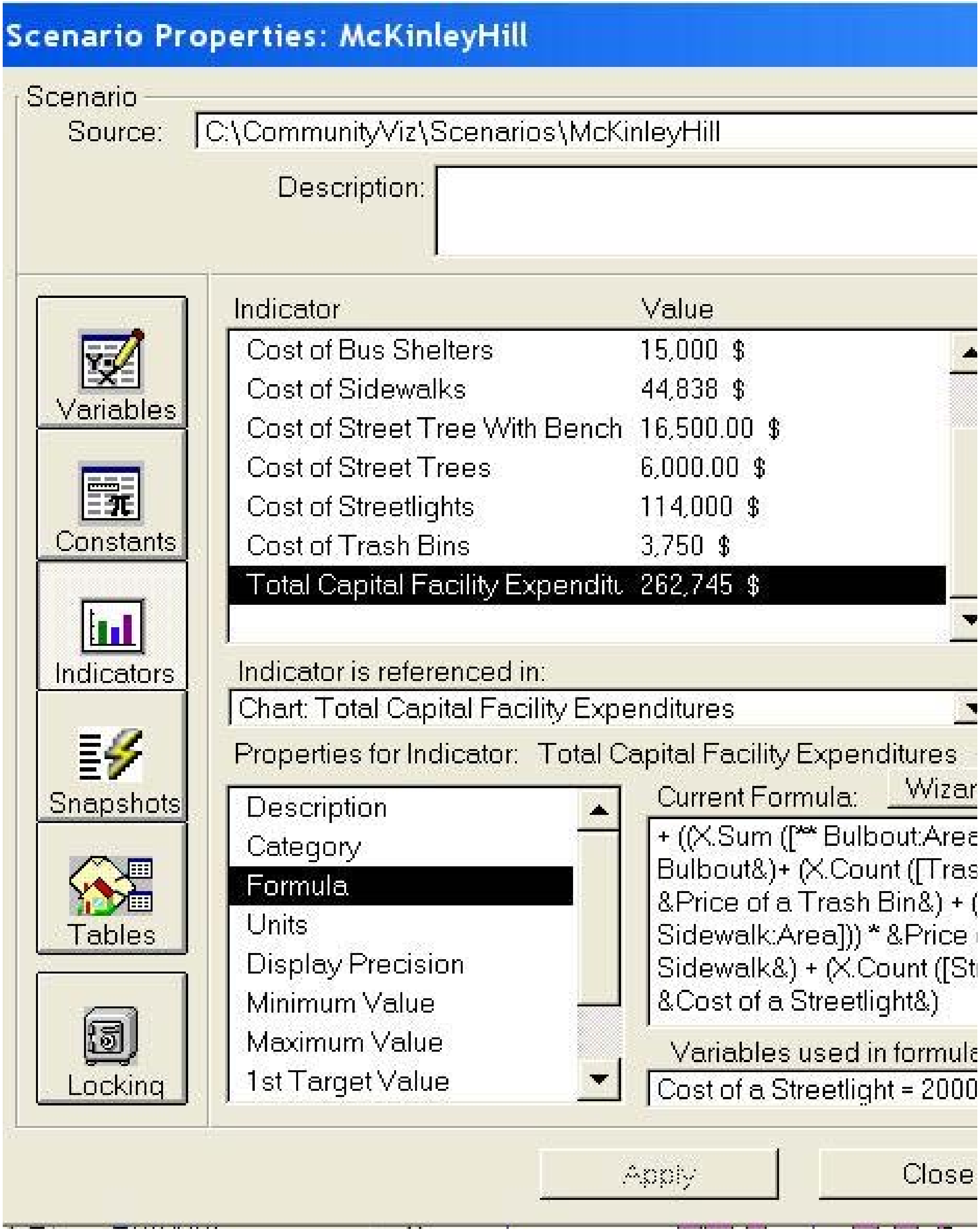
The second step for the setup of an indicator is to define the formula. This can be done with the help of a wizard and "X functions." In this very simple example, the number of features in the "Benches" theme are counted and multiplied by the price of a street bench.



In the following indicator for the cost of sidewalks, an "automated" theme for sidewalks is used. An automated theme is named with the two leading asterisks (**). The area attribute in this theme is automatically populated when a sidewalk polygon is digitized. The total area for all sidewalk polygons are summed and multiplied by the price per square foot of a sidewalk.



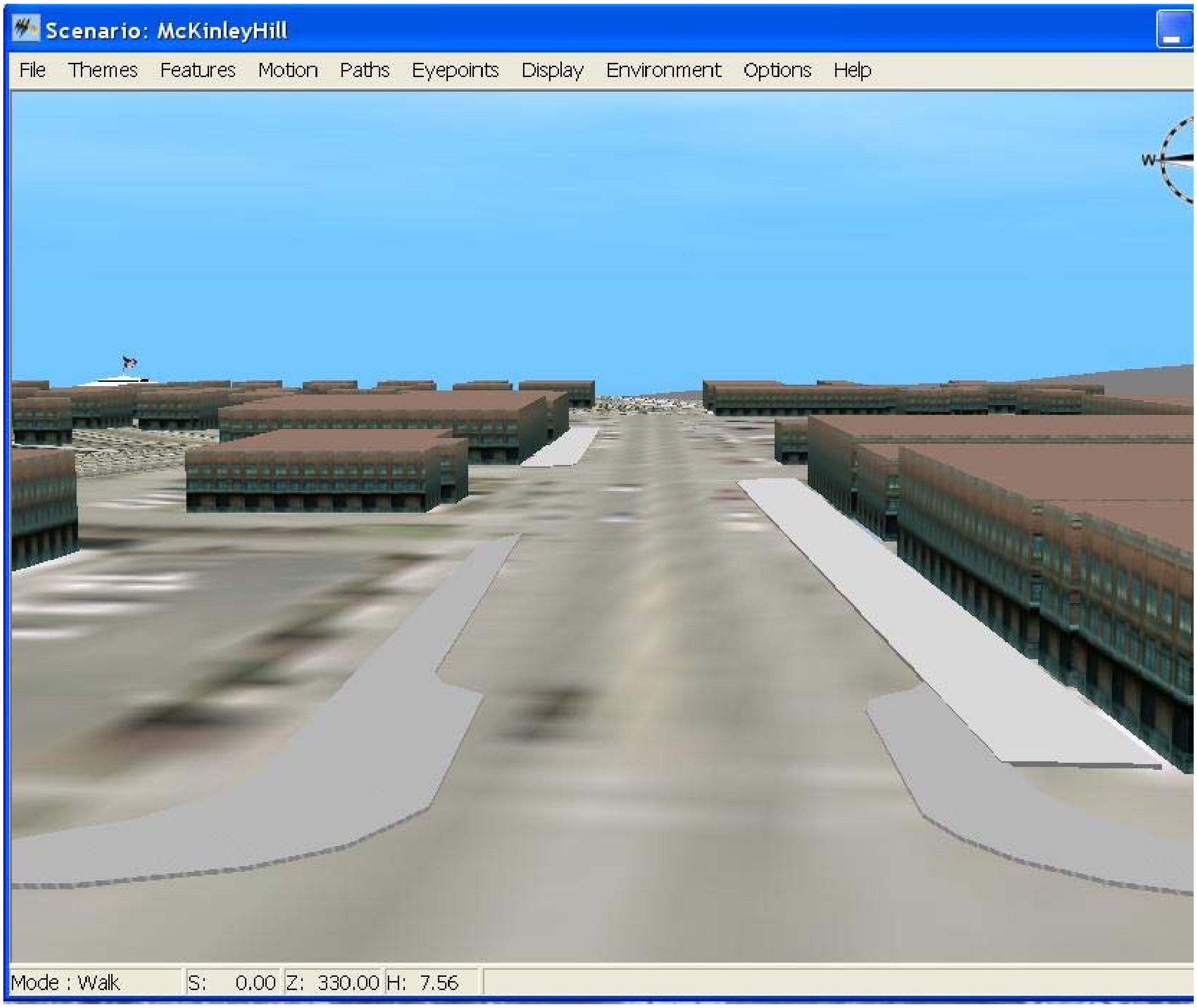
A formula can involve multiple themes. All of the individual indicator calculations are included in the formula for the total project costs.



Setting up the 3D scene is a matter of choosing 3D objects for point themes, textures for extruded building outlines, creating terrain, and draping it with the ortho photo. Sugar maples were chosen for the actual street trees, and they were a choice available in the extensive 3D library. Sitebuilder 3D™, which is included with CommunityViz™ and written by Multigen-Paradigm, is closely integrated with the scenario. Changes in the 2D themes can be quickly viewed in 3D.

Suppose the street tree budget were cut. The trees can be toggled off within the 3D window to get a quick impression of the change to the look of McKinley Avenue.

Remove everything except for the sidewalks and bulbouts. Visualizing the results of the choices made for the street improvements is much more effective than looking at a budget list on a spreadsheet.



The capital facility model is a prototype. Future development plans include:

- Expand the 3D graphics with custom OpenFlight buildings using SiteBuilder 3D.
- Capture fly-through movies to .avi files for use on any computer.
- Practice using CommunityViz interactively with a test city employee audience.
- Run CommunityViz live at the neighborhood council meeting, fall, 2003.

The above project reflects only a day and a half of work. This illustrates how a model can be quickly put together for exploring planning options. Other planned models include a rezone visualization project for difficult rezoning situations. At planning commissions meetings, public hearings, and the city council meetings, visualization of the effects of different zoning codes, land uses, building heights, and setbacks will be shown in the context of the surrounding adjacent neighborhoods.

Modeling Parks, the ForeverGreen Park Capacity Study

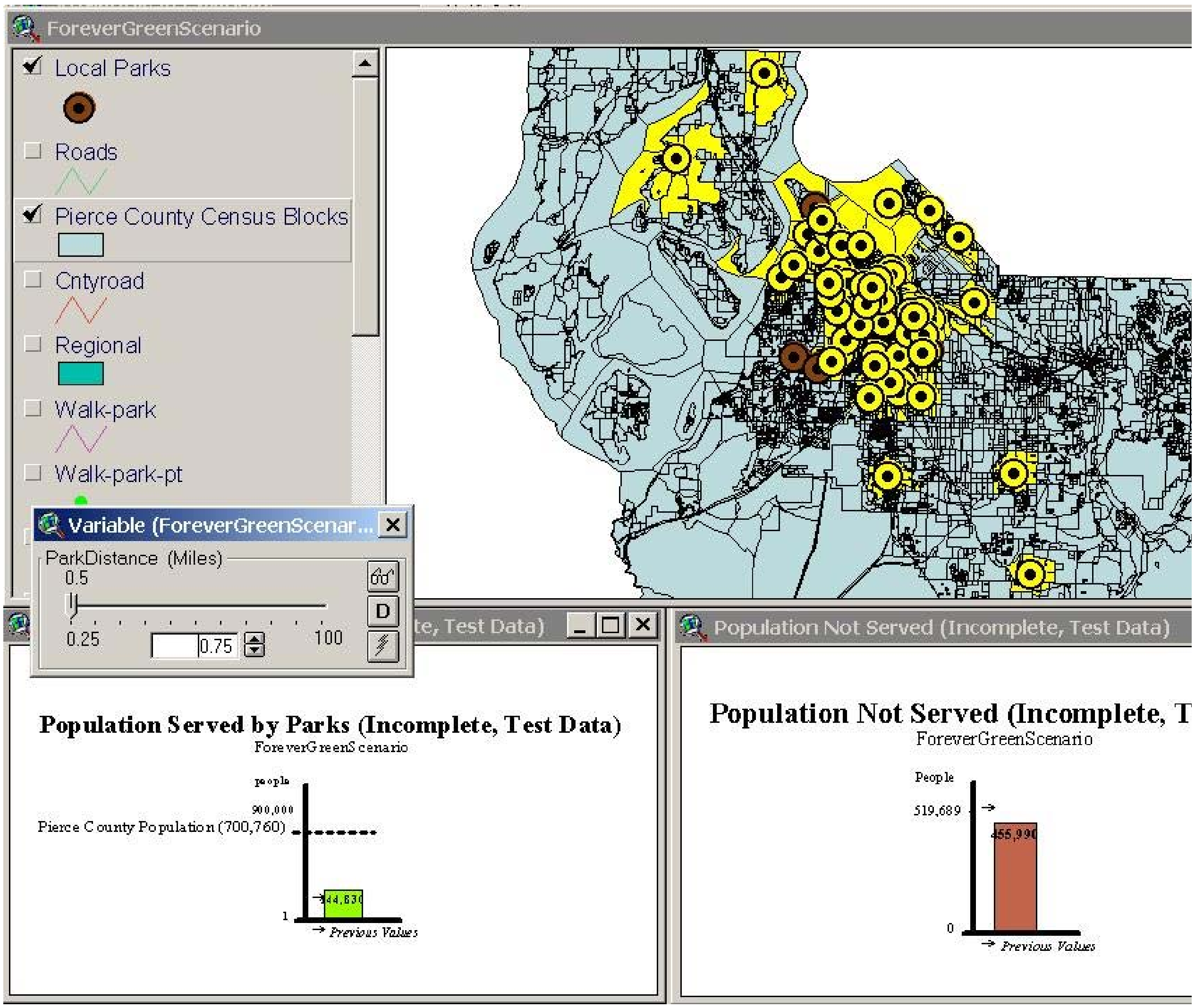
The ForeverGreen project, a multi-agency cooperative study, has moved forward in the past year. The study area is Pierce County, Washington, and it involves several park agencies. Data collection is well under way, although it is still not complete.

The questions to be answered by this project are:

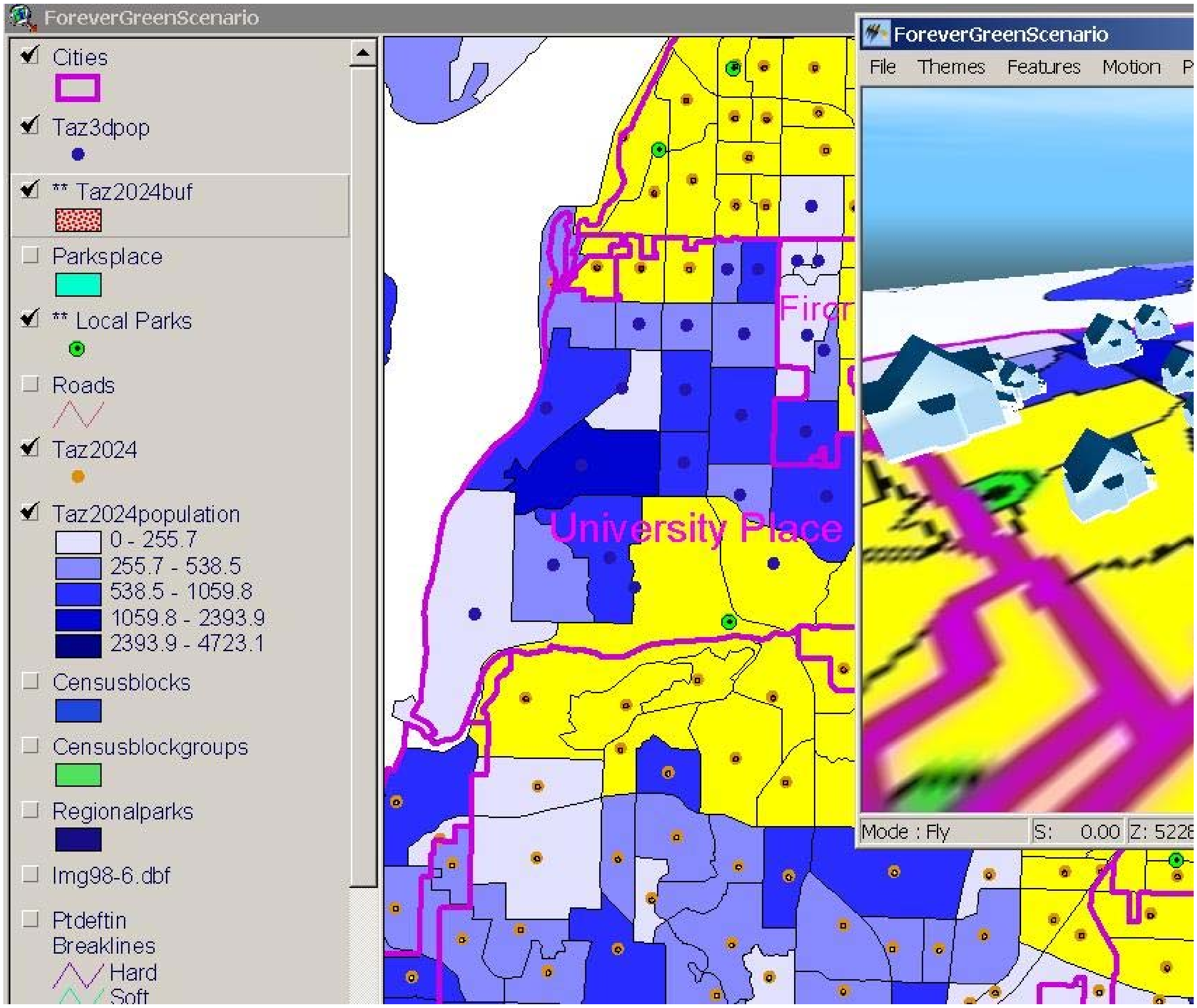
- Are there enough parks now and 20 years into the future?
- Where do we need new parks?
- Where are parks and facilities?

Pierce County GIS has contributed the web-based data collection application as well as the web site for use by the public to locate a local park. This site can be seen at www.DiscoverParks.org. A park can be found by city, zip code, neighborhood, address, facility type, park name, or by helpful lists. Once the park has been chosen, the citizen can get driving directions, see a ground photo and an aerial photograph, a facility map, and rental facility options. Other tabs bring up a map of bus stops by the park, points of interest such as restaurants close to the park, and a weather link. This is a "must-see" Internet site.

The analysis of park placement takes into account both walking access and driving access. The traditional park placement study considers a half-mile service area around the park for walking access. This is particularly a consideration for lower income areas or where bus access is not available. The following scenario is using total population for the indicators, and variations of this compare to the 2000 census data for households of less than $10,000 in income. Those areas with high concentrations of a low-income population outside of the half-mile buffer or bus stops are especially in need of a local park. Not all of the Pierce County parks are yet present in the following example.



Assumptions can be challenged, such as the distance a person will walk to a park. In this example, the variable for park distance was changed from 1/2 mile to 3/4 of a mile with a slider bar, and the indicator charts of population served and not served changed accordingly.



The understanding of where population may be underserved by parks can be quickly communicated with 3D visualization techniques. In this example, which uses test data and does not reflect the actual status of parks in University Place, the larger 3D houses show where parks are most needed by the largest populations. This scenario uses the year 2024 population projections taken from the Tacoma, Pierce County, and Puget Sound Regional Council transportation models.

Another borrowed idea is the "4-Times Rule" from a 1997 economic development study done by Chandler, Brooks, and Donohoe of Olympia, Washington. It states that people will drive one fourth of the time they plan to spend at a destination or activity. This principle is being applied to park modeling for specific facilities in a park, such as softball fields. A service area of 6 miles was used for a softball park using the 4-Times Rule. When the park inventory is completed, a series of scenarios will be made for several different kinds of park facilities.

Future Plans

The ForeverGreen parks model will be used and developed more actively as the database of Pierce County parks is completed. As the CommunityViz™ software is ported to ArcGIS, a link to network analysis will become available. The service area calculations will be modified to use the road network with either walking distance or driving time for the indicator measurements.

This, along with the consideration for specific facilities in a park, will be used to create custom service areas for each park. Park capacity will be an additional factor to be modeled, based on park size and facility type. Once these new modeling techniques have been developed, comparisons of current and projected population use of parks will be done.

Conclusions:

The CommunityViz™ software suite has proven to be a good integration of GIS data design and planning tools. New modeling tools needed by planners have been added with the latest release of the software, and more are planned for the ArcGIS version. The software will play a role in Tacoma's outcome measurements of economic growth and other GIS projects in the future.

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