Developing Housing and Employment Data Using GIS

OR

GIS: FRIEND OR FOE?

San Joaquin Valley TP+/Cube Users Group
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Overview

- The Ideal
- The Real
- Housing Inventory
- Employment Inventory
- Forecasts
- Lessons Learned
Goals of GIS Land Use

- More accurate inventory of existing uses
- Input to forecasts (vacant land)
- Document assumptions
- Display graphics
- Ideally, provide for easy modification of transportation analysis zones (TAZs)
The Ideal

β Jurisdictions provide current parcel data
β Use GIS to aggregate into TAZs
β Vacant parcels used for forecasts
Example: Parcels with Uses
Example: Parcels and TAZs
The Real

- Parcel data often incomplete
- Residential parcel data do not include demographics (population, income)
- Non-residential parcel data do not indicate size, employment or type of use
- Need to combine variety of sources
Housing Inventory Process

- Census Blocks for total counts
- Convert to points to fit into TAZs
- Census Block Groups for demographics
- Building Permits to go from 2000 Census to model base year
Example: Fresno Downtown
Example: Fresno TAZs

Goal: Housing by type and vehicle ownership in each TAZ

Ideally, also respond to changes in TAZ boundaries
Census Blocks

- Total Population
- Total Housing Units
Census Block Groups

- Housing type (detached, attached)
- Household size
- Household income
- Vehicle ownership
Census Block Centroids

- Find X and Y for each centroid (awkward script in ArcView)
- Assign housing values to points
- Easier to aggregate into TAZs
- Do not need exact fit between Census and TAZ maps
Example: Final 2000 Housing

- Housing by type
- Can still be used if TAZs change
Building Permits for Housing After 2000

Source Data

<table>
<thead>
<tr>
<th>Building Permit Data</th>
<th>Source Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Source data from each agency</td>
</tr>
<tr>
<td></td>
<td>May be hard copy</td>
</tr>
<tr>
<td></td>
<td>Reformat addresses for geocoding</td>
</tr>
<tr>
<td></td>
<td>Combine street numbers, names</td>
</tr>
<tr>
<td></td>
<td>Standardize spelling</td>
</tr>
</tbody>
</table>

Input to Geocoding
Example: Shasta County Permits

- Residential building permits
- Color by jurisdiction
Example: New Subdivisions
Example: New Subdivision

- New streets not found in geocoding
- Use parcel map to line up new addresses
- If a building permit address can be placed in each parcel, you might be doing something right!
Combine Census and Permits

- Assign TAZ to Census block points and building permit points
- Aggregate from DBF portion of shape file using Excel pivot table
Employment Inventory

- Need employees by trip generation category (Retail, Service, etc...)
- Often start with commercial database (InfoUSA, Dun and Bradstreet)
- Correct and supplement database
- Geocode addresses
- Compare to control totals
Employment Database Corrections

- Incorrect employment (Example: 800 company-wide Clark Pest Control employees put at one 5-employee branch)
- Incorrect category (All CSU Fresno as retail book store?)
- Missing government and schools (IRS not in Fresno?)
- PO Boxes – fill in addresses from phone or internet
- Agricultural employment at home office of labor contractors
Geocode Employment Addresses

- Need to decide how many unmatched need manual research
- “Ties” could be same street address in more than one city
Visual Check for Reasonable Locations and Sizes
Detailed Check of Mall

Example: Outlet mall on I-5 in Anderson

Get mall directory from internet

Make sure all listed stores are in database
**Compare to Control Totals**

**Comparison of 2003 Employment Totals**

<table>
<thead>
<tr>
<th>Category</th>
<th>2003 Average Employment</th>
<th>Compare To EDD</th>
<th>Adjusted Employees</th>
<th>Adj/EDD</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>EDD CES</td>
<td>Woods &amp; Poole</td>
<td>Database</td>
<td></td>
<td></td>
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<tr>
<td>Agriculture</td>
<td>46,200</td>
<td>73,413</td>
<td>30,069</td>
<td>0.65</td>
<td>46,194</td>
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<tr>
<td>Mining</td>
<td>200</td>
<td>634</td>
<td>190</td>
<td>0.95</td>
<td>199</td>
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<tr>
<td>Construction</td>
<td>18,100</td>
<td>20,918</td>
<td>17,608</td>
<td>0.97</td>
<td>17,966</td>
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<tr>
<td>Manufacturing</td>
<td>27,100</td>
<td>30,522</td>
<td>27,917</td>
<td>1.03</td>
<td>27,202</td>
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<tr>
<td>Wholesale</td>
<td>12,500</td>
<td>16,900</td>
<td>13,558</td>
<td>1.08</td>
<td>12,644</td>
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<tr>
<td>Man / Whsl Subtotal</td>
<td>39,600</td>
<td>47,422</td>
<td>41,475</td>
<td>1.05</td>
<td>39,846</td>
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<tr>
<td>Retail</td>
<td>33,800</td>
<td>65,514</td>
<td>65,337</td>
<td>1.93</td>
<td>34,833</td>
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<tr>
<td>Trans/Com/Util</td>
<td>13,800</td>
<td>17,753</td>
<td>14,598</td>
<td>1.06</td>
<td>13,902</td>
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<td>Fin/Ins/RE</td>
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<td>Education Services</td>
<td>3,400</td>
<td>3,936</td>
<td>3,428</td>
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<td>Health Services</td>
<td>31,500</td>
<td>113,837</td>
<td>30,941</td>
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<tr>
<td>Service Other</td>
<td>61,000</td>
<td>63,810</td>
<td>61,921</td>
<td>1.05</td>
<td>61,921</td>
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<tr>
<td>Service Subtotal</td>
<td>95,900</td>
<td>113,837</td>
<td>96,687</td>
<td>1.03</td>
<td>96,722</td>
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<td>Govt Educ</td>
<td>33,400</td>
<td>63,627</td>
<td>29,671</td>
<td>0.89</td>
<td>33,416</td>
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<td>Govt Other</td>
<td>34,200</td>
<td>33,811</td>
<td>34,145</td>
<td>0.99</td>
<td>34,145</td>
</tr>
<tr>
<td>Govt Milit.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Government Subtotal</td>
<td>67,600</td>
<td>63,627</td>
<td>63,482</td>
<td>0.94</td>
<td>67,561</td>
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<td>Education Subtotal</td>
<td>36,800</td>
<td>177,464</td>
<td>33,607</td>
<td>0.91</td>
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<tr>
<td>Unclassified</td>
<td>411</td>
<td>411</td>
<td>411</td>
<td>1.00</td>
<td>411</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>328,900</strong></td>
<td><strong>432,514</strong></td>
<td><strong>348,688</strong></td>
<td><strong>1.06</strong></td>
<td><strong>331,413</strong></td>
</tr>
</tbody>
</table>

EDD CES does not include self-employed
Woods & Poole includes all full and part-time employees

- Get database as close as possible - recategorize employers, find missing schools
- Factor to established control totals such as Employment Development Department (EDD)
Assign TAZs to Employment Points

- Assign adjusted points to TAZs as last step
- Orange squares show employers missing from InfoUSA - used manual research to add in
GIS Review of Employment Data

Example:
Fresno COG office
Can review land use category, employees, TAZ
Still at old address in 2003!
GIS as Forecast Tool

- Identify vacant land if available
- Use POINTS to place future land uses
- Don’t use parcel boundaries if they are poor fit with future development
- May need multiple points for different land uses, phasing years
- Add points for growth of existing uses (hospitals, government offices)
Vacant Land Inventory
Allocate Known Development
GIS Display

ß Highlight TAZs with largest housing changes
Lessons Learned

β Use POINTS for Census data, employment sites and future development
β Manually check all geocoding that isn’t a near-perfect address match
β Prioritize manual review to focus on larger employers
β Assign TAZs to points as last step
β Aerial photos that overlay GIS can be a huge help