

## **The Rural Indicators Map Machine: A Multi-Dimensional Approach to Rural Data Visualization**

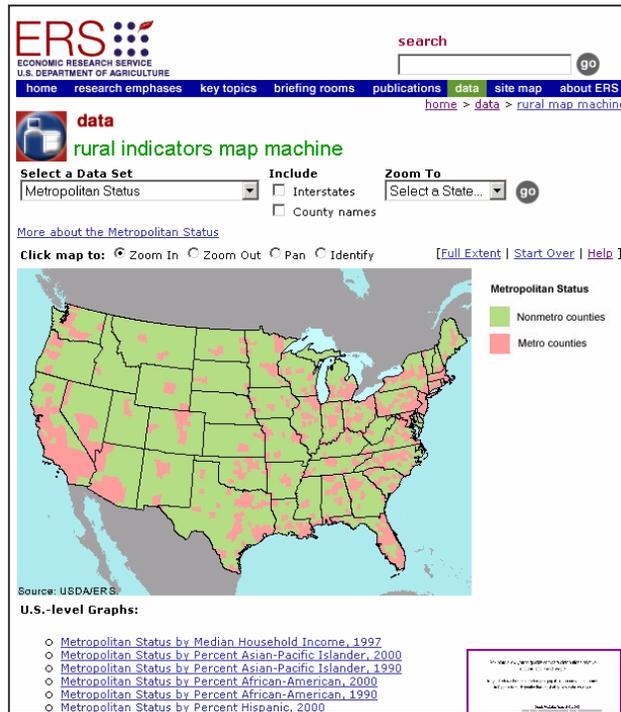
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The Rural Indicators Map Machine is an Internet-based tool that allows the user to visualize ERS rural typologies, and demographic and economic data through dynamic maps and graphs. With the advent of Web-based GIS (geographic information system) technology, it is now possible to implement applications that allow users to create maps on the fly, explore different variables, query data, and directly interact with maps to move to an area of interest and get information about map features. The Rural Indicators Map Machine takes this a step forward by providing box-plots that allow the user to see variations in demographic and economic data across typology categories, adding another dimension of analysis to the application. Thus, instead of static map images and graphs and pre-defined tables on the web, the application allows for the integration of interactive maps, data, and graphs at the user's desire.

The Rural Indicators Map Machine offers users the opportunity to browse, analyze, and interact with: 1) rural typologies (Metropolitan Status, Natural Amenities Scale, ERS County Typology Codes, Urban Influence Codes, Rural-Urban Continuum Codes, and Rural-Urban Commuting Areas); 2) 1990 and 2000 Census data (total population, population change, and racial percentages); and 3) economic data (median income and unemployment rates). The box plots not only allow the user to see data variations across typologies at the national level, but also illustrate such variations at the state level. The Map Machine also allows the user to compare temporal data sets by stacking graphs. Another feature is the ability to display multiple data layers of different scales (county-level typologies versus Census tract-level typologies).

The Map Machine application was created with ArcIMS and Active Server Page (ASP) technology by the ERS geographic information system (GIS) team in conjunction with the ERS Rural Economy Branch and web team. ArcIMS software serves up the interactive maps, while ASP ensures seamless connections with databases and the ArcIMS server. The Map Machine is available at: <http://www.ers.usda.gov/Data/RuralMapMachine> .

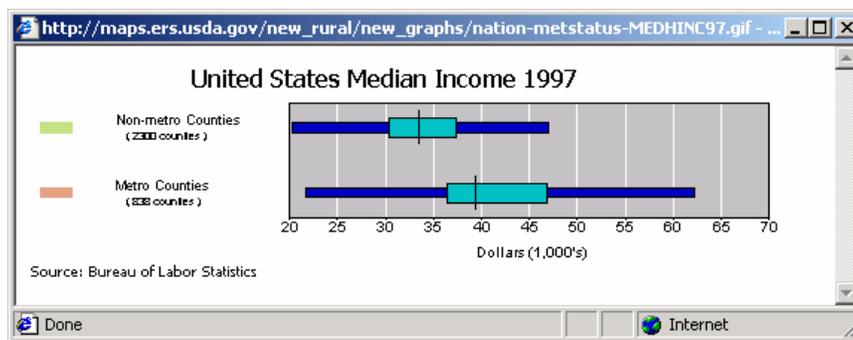
## Features of the Rural Indicators Map Machine



Initially, the front page loads with a map of Nonmetro and Metro counties nationwide. Unlike static maps on the web, the user can interact with the map by zooming, panning, and identifying a county or Census tract and select graphs of demographic or economic data for a rural typology.

To look at the distribution of median income nationwide by metropolitan status, the user can click a link in which a U.S.-level box plot opens in a separate window.

## The Map Machine's Box Plots



Box plots allow the user to quickly compare distributions of demographic and economic data within a selected rural typology. The box plot entitled "United States Median Income 1997" shows the distribution of median income across metro and nonmetro counties. As expected, metro counties have a higher median income. The green box denotes the lower and upper quartiles (25% and 75% of observations), and the middle bar denotes the median of all observations. The dark blue bar shows the lower and upper data extents, excluding outliers. The user could open another box plot to look at the distribution of unemployment amongst metro and nonmetro counties in the United States.

## Zoom To State Functionality

The screenshot displays the ERS Rural Indicators Map Machine interface. The main map shows Georgia with counties colored by Metropolitan Status: green for Nonmetro counties and red for Metro counties. A legend on the right side of the map identifies these colors. The interface includes a search bar, navigation controls (Zoom In, Zoom Out, Pan, Identify), and a 'Zoom To' dropdown menu set to 'Georgia'. Below the map, there are links for 'Georgia Graphs' and a list of available data series.

**Metropolitan Status Legend:**

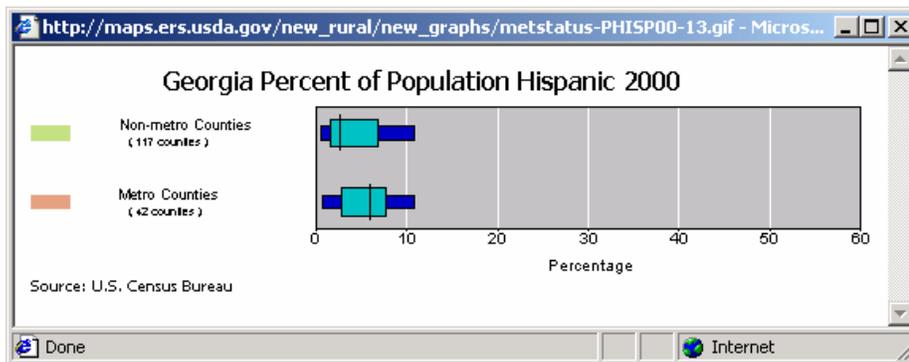
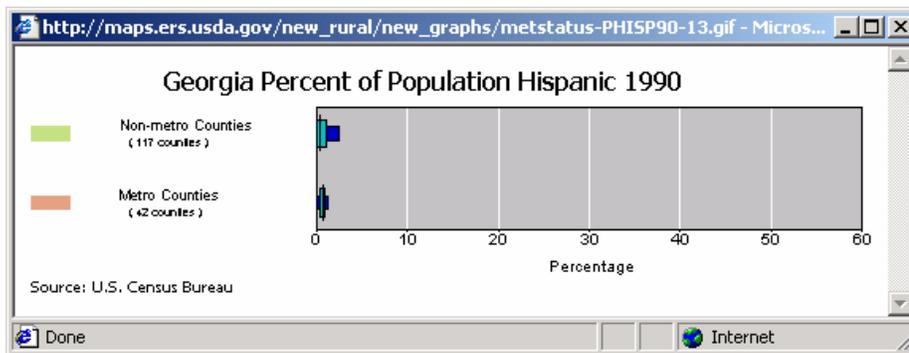
- Nonmetro counties (Green)
- Metro counties (Red)

**Georgia Data Summary Table:**

FIPS Code:	13
State:	Georgia
Population, 1990:	6,478,216
Population, 2000:	8,186,463
Population Change, 1990 - 2000:	26.37%
Percent White, 1990:	71.01%
Percent African-American, 1990:	26.96%
Percent Asian-Pacific Islander, 1990:	1.17%
Percent Native American, 1990:	0.21%
Percent Hispanic, 1990:	1.68%
Percent White, 2000:	65.07%
Percent African-American, 2000:	28.70%
Percent Asian-Pacific Islander, 2000:	2.12%
Percent Native American, 2000:	0.27%
Percent Hispanic, 2000:	5.32%
Percent Biracial, 2000:	1.39%
Unemployment Rate, 1995:	4.9%
Unemployment Rate, 1996:	4.6%
Unemployment Rate, 1997:	4.5%
Unemployment Rate, 1998:	4.2%
Unemployment Rate, 1999:	4.0%
Unemployment Rate, 2000:	3.7%
Median Household Income, 1997:	\$36,372

Using the **Zoom To** select box, the user can zoom into a state of interest. Zooming to a state not only focuses the map on the desired state, but also pops up a data summary for the state. To examine demographic and economic data by a rural typology within a state, the user can select graphs to view.

By opening up and stacking box plots for percentage of Hispanics living in metro and nonmetro counties in 1990 and 2000, the user can compare urban and rural distributions over the decade. As illustrated, there has been a large increase of Hispanics in the state of Georgia during the 1990's, however, the largest increase has been in Georgia's metro counties.



## Interacting with the Map

Interactive tools for navigating the map include the **Zoom In**, **Zoom Out**, **Pan**, and **Identify** tools. These tools require the user to click on the map.

Click map to:  Zoom In  Zoom Out  Pan  Identify

County:	Laurens
State:	Georgia
FIPS Code:	13175
Rural-Urban Continuum:	6
Urban Influence Code:	3
Natural Amenities Scale:	5
County Typology Code:	6
Metropolitan Status:	0
Population, 1990:	39,988
Population, 2000:	44,470
Population Change, 1990 - 2000:	11.21%
Percent White, 1990:	66.19%
Percent African-American, 1990:	33.32%
Percent Asian-Pacific Islander, 1990:	0.43%
Percent Native American, 1990:	0.06%
Percent Hispanic, 1990:	0.09%
Percent White, 2000:	63.44%
Percent African-American, 2000:	34.53%
Percent Asian-Pacific Islander, 2000:	0.83%
Percent Native American, 2000:	0.20%
Percent Hispanic, 2000:	1.18%
Percent Biracial, 2000:	0.60%
Unemployment Rate, 1995:	5.6%
Unemployment Rate, 1996:	5.2%
Unemployment Rate, 1997:	4.5%
Unemployment Rate, 1998:	7.6%
Unemployment Rate, 1999:	7.9%
Unemployment Rate, 2000:	5.9%
Median Household Income, 1997:	\$28,950

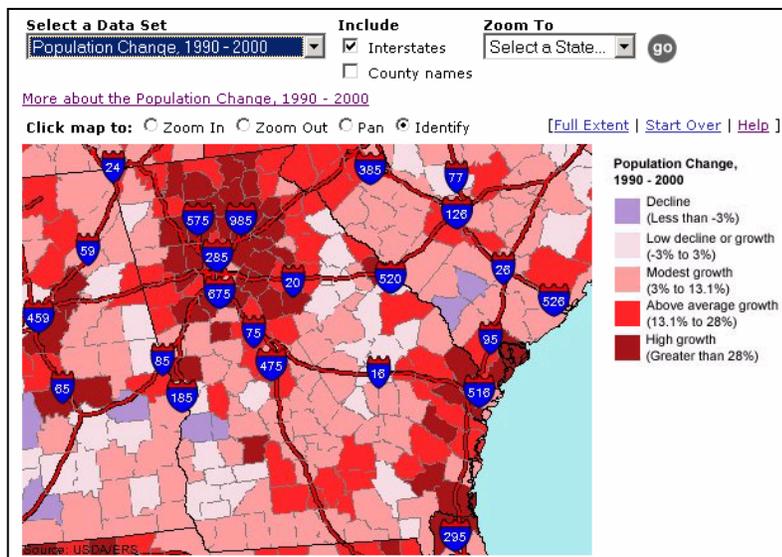
Using the **Identify** tool, the user can get information for a particular county. All of the rural typology codes, Census, and economic data are shown in the pop-up window.

## Changing the Data Sets

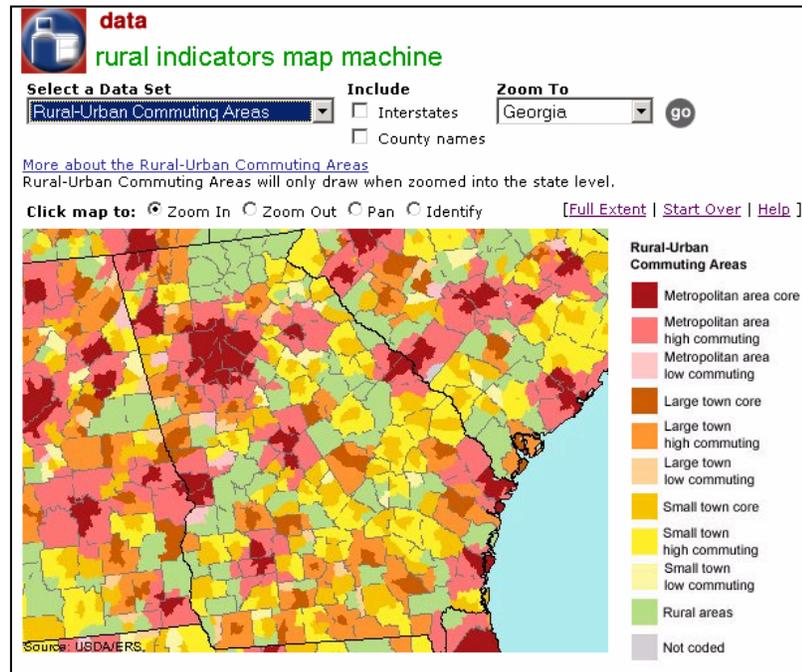
**Select a Data Set**  
 Metropolitan Status

**Include**  
 Interstates  
 County names

Regardless where the user's geographic interest is located, the data sets can be changed at any scale of the map. The reference layers (interstates and county names) can also be turned on and off to help locate desired features.



While most of the data has been at the county level, one Census tract-based ERS rural typology, the Rural-Urban Commuting Areas, has been included in the list of data sets.



## Next Steps

The Rural Indicators Map Machine is currently at the second version. While the application offers a multitude of data visualization possibilities at this version, the following additions may appear in it in the future:

- Addition and revision of data sets:
  - Updated economic data sets at the county level.
  - Additional tract-level data sets such as Census data.
  - Additional reference layers.
- Dynamically generated graphs: in the current form of the application, the graphs are cataloged in a back-end database and called through scripting. The next step is to dynamically create the graphs with JavaScript.