Standards and Data Structure for Statistical Geography

Mark Cygan, Director of Map, Chart, Data Production and SDI
Carmelle Terborgh, Team Lead, Global Affairs and UN Account Manager
Outline

- Why link geospatial and statistical information?
- Standards
- Data Structures
- Geocoding
- Community Analyst: an opportunity
### Proportion of Poor People at County Level

**County Average**

#### 10 Best Counties

<table>
<thead>
<tr>
<th>Counties</th>
<th>Proportion of Poor People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiambu</td>
<td>23%</td>
</tr>
<tr>
<td>Murang’a</td>
<td>31%</td>
</tr>
<tr>
<td>Nyeri</td>
<td>32%</td>
</tr>
<tr>
<td>Nyandarua</td>
<td>34%</td>
</tr>
<tr>
<td>Kirinyaga</td>
<td>38%</td>
</tr>
<tr>
<td>Nakuru</td>
<td>42%</td>
</tr>
<tr>
<td>Elgeyo-Marakwet</td>
<td>43%</td>
</tr>
<tr>
<td>Mombasa</td>
<td>44%</td>
</tr>
<tr>
<td>Nairobi</td>
<td>44%</td>
</tr>
<tr>
<td>Meru</td>
<td>45%</td>
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</table>

#### 10 Worst Counties

<table>
<thead>
<tr>
<th>Counties</th>
<th>Proportion of Poor People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homa Bay</td>
<td>71%</td>
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<tr>
<td>Kilifi</td>
<td>70%</td>
</tr>
<tr>
<td>Kitui</td>
<td>70%</td>
</tr>
<tr>
<td>Busia</td>
<td>67%</td>
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<tr>
<td>Nyamira</td>
<td>67%</td>
</tr>
<tr>
<td>Kisumu</td>
<td>65%</td>
</tr>
<tr>
<td>Siaya</td>
<td>64%</td>
</tr>
<tr>
<td>Tana River</td>
<td>64%</td>
</tr>
<tr>
<td>Kakamega</td>
<td>63%</td>
</tr>
<tr>
<td>Mandera</td>
<td>63%</td>
</tr>
</tbody>
</table>

*Source: World Bank Institute*
Proportion of Poor People at County Level

10 Best Counties

- Kiambu: 23%
- Murang’a: 31%
- Nyeri: 32%
- Nyandarua: 34%
- Kirinyaga: 38%
- Nakuru: 42%
- Elgeyo-Marakwet: 45%
- Mombasa: 44%
- Nandi: 44%
- Meru: 45%

10 Worst Counties

- Homa Bay: 71%
- Kilifi: 70%
- Kitui: 70%
- Busia: 67%
- Nyamira: 67%
- Kisumu: 65%
- Siaya: 64%
- Tana River: 64%
- Kakamega: 63%
- Mandera: 63%

Source: World Bank Institute
Visualize change ... over time and place

Teacher to Pupils Ratio
County Average

2009

2011

Changes 2009-2011

Source: World Bank Institute
Integration of statistical and geospatial information

An essential need

• Humanitarian Assistance
  - Disaster Management
  - Famine/Food Security

• Sustainable Development
  - Climate Adaptation
  - Public Health
  - Economic Development

• Governance
  - Accountability
  - Transparency
Relevant Standards

- Statistical
- Information Technology
- Geospatial
Geospatial Standardization

- Basic Geographic Structures
- Content Description
- Data Management
- Data Formats
- Visualization
- GeoWeb Services
GIS
A Complete System for Geographic Information

- Web
- Mobile
- Desktop
- Cloud
- Online
- Enterprise
Geospatial Technology is Changing Rapidly

Coevolving with Other Enabling Technologies

Helping Us Understand Our World
Interoperable: Standards & Specifications

- ISO
  - Metadata, Spatial Schema ....
- OGC
  - GML, WFS, WMS, WCS, KML ...
- Web (W3C)
  - REST, SOAP, XML ...
- Enterprise Integration
  - SOAP, XML, SQL...
- Application Content/Social Media
  - CAD, Image, PDF, GeoRSS ...

New Media
Esri is Publishing Our REST Interface as an Open Standard

Any Application

Open REST API

Open Data Access
GIS Data Models
Collected locally, regionally, nationally, globally . . . and shared freely

- Address
- Agricultural
- Atmospheric
- Base Map
- Biodiversity
- Census
- Admin Boundaries
- Defense-Intel
- Energy Utilities
- Environmental
- Forestry
- Geology
- Groundwater
- Health
- Historic Preservation & Archaeology
- Homeland Security
- Hydro
- IHO
- Land Parcels
- Local Government
- Marine
- National Cadastre
- Petroleum
- Pipeline
- Telecommunications
- Transportation
- Water Utilities
Census Model from [http://support.esri.com](http://support.esri.com)

### Simple feature class

**CensusTract**

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<th>Precision</th>
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</table>

Small, relatively permanent subdivisions of Counties

- Federal Information Processing Standards Code
- Census Tract ID
- Unique Census TractID within State
- Urban/Rural Code
- Functional Status
- Working Housing Count
- Legal Statistical Area Description
- Central Business District

*Also, Traffic Analysis Zones, County/Subdivision, ZipCode/PopulationArea*
Geocoding

- Addresses
- Situs Addressing (place, not street address)
- Other geographies...
  - e.g. watershed, ecoregion, etc.
- Administrative units
- Gazetteers
Basic Definition

**Geocode:**
- To assign a street address to a location.
- A code representing the location of an object, such as an address, a census tract, a postal code, or an x,y coordinate.
Lack of Addressing...

- Revenue collection
- Foreign investment
- Regional and global economy
- Challenges to demographic census
- Emergency and security services
Situs Addressing:
the Challenge of Addressing in Africa

- Situs Addressing Project by UN Economic Commission for Africa
- Meeting in Addis Ababa, Ethiopia at UNECA on 23-24 April 2005
Progress in larger African Cities:
Example from Addis Ababa, Ethiopia
Identification of different addressing schemes
...in an African context

1. Urban – planned
2. Urban – unplanned
3. Slum/Informal
4. Rural
5. Tribal (Rural)

Source: Coetzee, Address Data Exchange in South Africa. 2008.
Complexity of Poverty

• More challenging than traditional urban environments
• Both deserve our attention

Project P040174: Caracas Slum Upgrading IBRD/IDA, 99-05

Image courtesy of AT Sistemas – Rosario Giusti de Perez
Recognizing multiple address schemes for one location

- City
- Postal
- Deed/Cadastre
- Utilities
- Census

Identification of naming schemes for streets & places

- Do not name streets after dates of events
- Do not name streets/places after people, esp. politicians
- Suggestion: flora and fauna are safe bets!
UN Second Administrative Level Boundaries (SALB)

- www.unsalb.org
  - Link from GGIM website
- Please (!) submit for your country

- Why?
  - Support the mapping of:
    - statistics over time
    - economic, environmental, social indicators, etc.
World Places Locator

Geocode world places including countries, states and provinces, administrative areas, cities, landmarks, water bodies, and more.

Geocoding Service by esri (last modified: March 10, 2009)

(3 ratings, 2116 views)

Sign in to rate this item.

Facebook Twitter

Description

The World Places Locator enables you to geocode various types of places around the world. This locator references a geodatabase of over twelve million places around the world that includes countries, states and provinces, administrative areas (e.g., counties), cities, landmarks, water bodies, and more. See Using standard geocoding tasks for the URL to use the service in ArcGIS Desktop or ArcGIS Server and to learn more about using tasks in your ArcGIS application.

The geodatabase is built primarily using the GeoNames Data that is accessible via Creative Commons Attribution 3.0 License through www.geonames.org. Esri has assembled selected records from the September 2010 GeoNames Data and appended additional attributes (e.g., description, rank, bounding coordinates, etc.) for use in this locator.

You may contribute to the future content of this locator by submitting or editing place names through GeoNames.

The locator accepts a single-line place name input (e.g., Paris, or Paris, France, or Washington, DC) and returns candidates sorted by match score and rank. This locator can be used to geocode single places or batch geocode up to 10 places per request. This locator is available at no cost for your personal or business use.

Comments (0)

Sign in to add a comment.
International Geospatial Geocoding Conference

- December 6-7, 2011
- Redlands, CA
- Organized by University of Southern California
Esri Community Analyst
What is Community Analyst?

- Web application
- Lives in the cloud
- Users simply log in to use it
- Easy to use – for non-GIS professionals
- Users don’t need to worry about maintaining data or software
Who is it for?

- Policy-makers, analysts, and advocates
- Government agencies
- Economic development agencies
- Planners
- Advocacy groups
- NGOs & non-profits
- Health agencies
- Consultants
Example Uses

- Grant applications
- Sustainable Communities applications
- Economic development
- Comparing cities and counties
- Communicating facts
- Dissolving false perceptions
- Resource planning for the future
What can you do?

• Explore these questions:
  1. Are we putting resources in the right place?
  2. How do we communicate why resources were allocated the way they were?
  3. How can we reach the community more effectively?
6,000+ Metrics: Current & Five-year Forecast
Sources of data

- Esri Projections
- Census (1990-2010)
- ACS (American Community Survey)
- CDC
- DHHS (CHSI)
- EPA
- USDA
- Social Security Administration
- Gfk-MRI
- Infogroup
- AGS Crime Indices
- ... and others
Exploration Tools: Trend Visualization

1990 Median Household Income by ZIP Codes

- $80,128 or greater
- $62,078 - $80,127
- $51,162 - $62,077
- $46,566 - $51,161
- $40,565 or less

Legend

Color-Coded Data
Exploration Tools: Trend Visualization
Exploration Tools: Trend Visualization

2015 Median Household Income by ZIP Codes

[Map showing income trends across ZIP codes]
Exploration Tools: Smart Map Search

2. Select Geography: Auto Selection

3. Refine your criteria: Smart Map Search

- **2010 Unemployment Rate**
  - Minimum: 10.4
  - Maximum: 30.8
  - Matches: 406 (25%)

- **2010 Median Age**
  - Minimum: 0.0
  - Maximum: 36.7
  - Matches: 299 (18%)

- **2010 Median HH Income**
  - Minimum: 50
  - Maximum: $57,988
  - Matches: 834 (52%)

Change variables...  Save Criteria List  My Criteria Lists

<Back  Show results on map
Ability to Create *Any* Area for Analysis

- Hand Drawn Areas
- Imported Shapefiles
- Ring Areas
- Drive Time Areas
- Standard Geographies
Targeting Resources

• **Problem:**
  - Each year anywhere from 3,000 to 49,000 people die in the US each year.
  - The elderly and young children are most susceptible.
  - The CDC recommends everyone over the age of 6 months get a flu vaccine.

• Where can we allocate a limited number of flu shot clinics to serve a large number of children in low-income areas?
Use Smart Map Search to Find Target Areas

Choose your criteria and Smart Map Search will indicate matches in green.

Here's how...

1. Select your criteria.
2. Choose your geography type.
   - Counties
   - ZIP Codes
   - Census Tracts
   - Block Groups
3. Refine your criteria.

Watch a short how-to video.

Get Started
Find Low Income Areas with Lots of Kids

Search Variables:
- Median Household Income
- Number of Kids Age 0-4
Select Search Variables and Set Ranges

<table>
<thead>
<tr>
<th>Use</th>
<th>Available Variables</th>
<th>Minimum</th>
<th>Distribution</th>
<th>Maximum</th>
<th>Matches</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Median HH Income</td>
<td>$0</td>
<td></td>
<td>$40,000</td>
<td>448</td>
<td>(43%)</td>
</tr>
<tr>
<td>2010 Total Population 0-4</td>
<td>100</td>
<td></td>
<td>602</td>
<td>177</td>
<td>(17%)</td>
</tr>
</tbody>
</table>

Change variables...  Save Criteria List  My Criteria Lists
Find Target Areas - In Green
Select a Flu Shot Clinic Location
**Examine the Surrounding Population**

Tapestry Segmentation Area Profile
Ranked by Households

JOHNSTON SQUARE ELEM SCHOOL
1101 VALLEY ST
Drive Time: 5 minutes

Latitude: 39.302847
Longitude: -76.604873

Top Twenty Tapestry Segments

<table>
<thead>
<tr>
<th>Rank</th>
<th>Tapestry Segment</th>
<th>Percent</th>
<th>Cumulative Percent</th>
<th>U.S. Households</th>
<th>Cumulative U.S. Households</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54. Urban Rows</td>
<td>36.3%</td>
<td>36.3%</td>
<td>0.3%</td>
<td>0.3%</td>
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<tr>
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<td>0.8%</td>
<td>3.8%</td>
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<td>Subtotal</td>
<td>78.1%</td>
<td></td>
<td></td>
<td>3.8%</td>
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</tr>
</tbody>
</table>
Know How to Reach the Population

54 Urban Rows

- Segment Code: 54
- Segment Name: Urban Rows
- LifeMode Summary Group: L3 Metropolis
- Urbanization Summary Group: U2 Principal Urban Centers II

Demographic
The Urban Rows population of approximately 1.1 million people, the smallest of all the Tapestry segments, is still shrinking due to urban renewal programs. With a median age of 33.4 years, this market is slightly younger than the national level. Household types are mainly a family mix of married couples, single-parent families, and other families. Grandparents are caregivers in many households; many homes are multigenerational. Nearly 7 in 10 residents are black, and 2 in 10 are white. Ten percent of the population is Hispanic.

Socioeconomic
The median household income for this market is $33,596; the median net worth is $21,888. Some households supplement their wage and salary income with Supplemental Security Income or public assistance. Nearly half of the employed residents work in white-collar occupations. Approximately 20 percent of the employed residents work in the health care industry. 10 percent have local government jobs. At 20 percent, unemployment is more than double the U.S. rate. Income and sports programs: Music is a big part of their...

Preferences

“Little access to the Internet at home. Go online at the library or at school.”

“Get their news from the radio.”
United States today, but Going Global
Global Solution

Esri Community Analyst

Basemaps (ArcGIS Online)
Statistical Data & Reports
Street Network for Drive Times
POI Data

USA
Canada
Europe
...