# Gridded Population of the World

1st Global Human Settlement Layer Workshop
JRC Ispra, Italy
October 21, 2014
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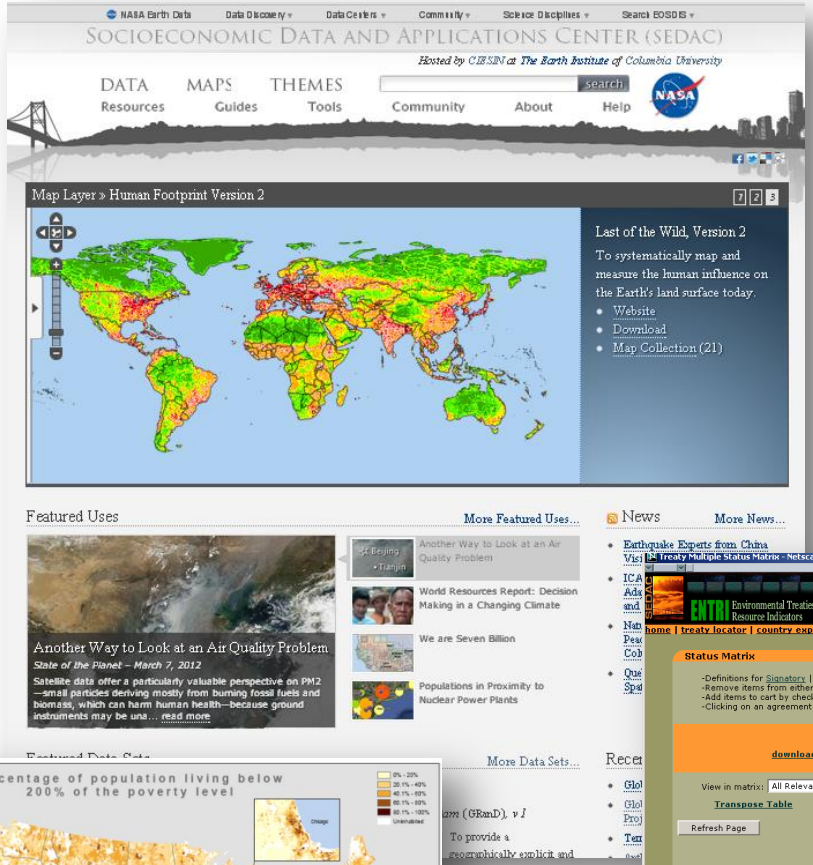
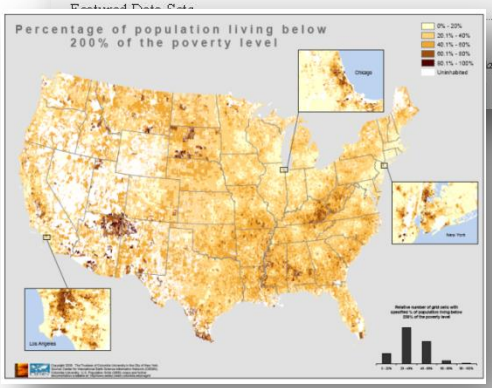
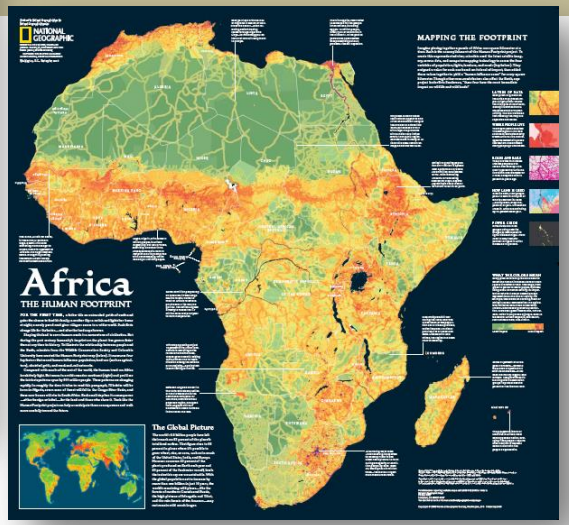
# Socioeconomic Data & Applications Center (SEDAC)








- Integration of social and earth science data
- Focus on human dimensions of environmental change
- Direct support to scientists, applied and operational users, decision makers, and policy communities

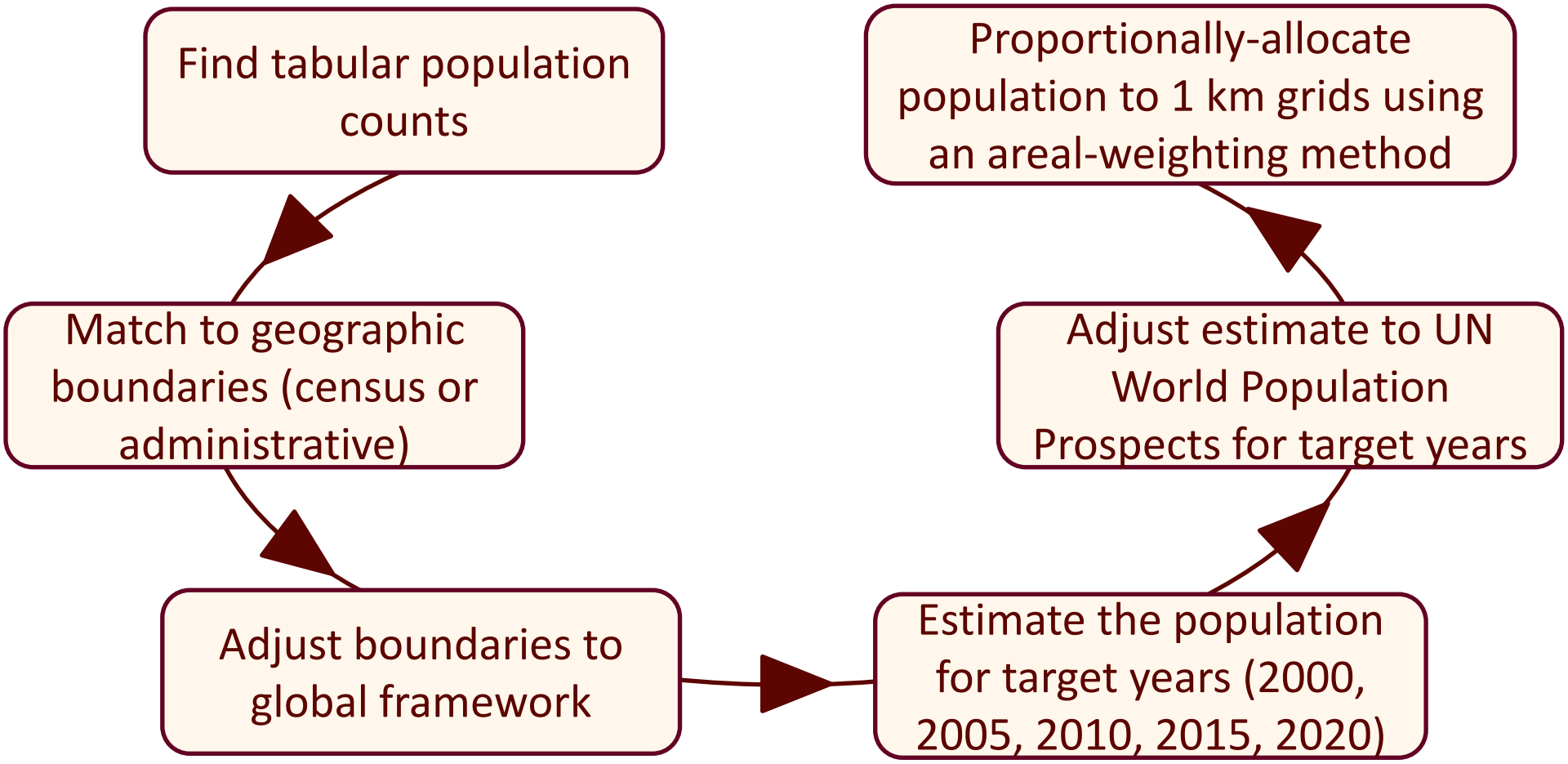
# History of GPW

- GPWv1 was an outgrowth of a Global Demography Workshop held at CIESIN in 1994

- Consensus that a consistent global database of population totals in raster format would be invaluable for interdisciplinary study (Deichmann et al., 2001)

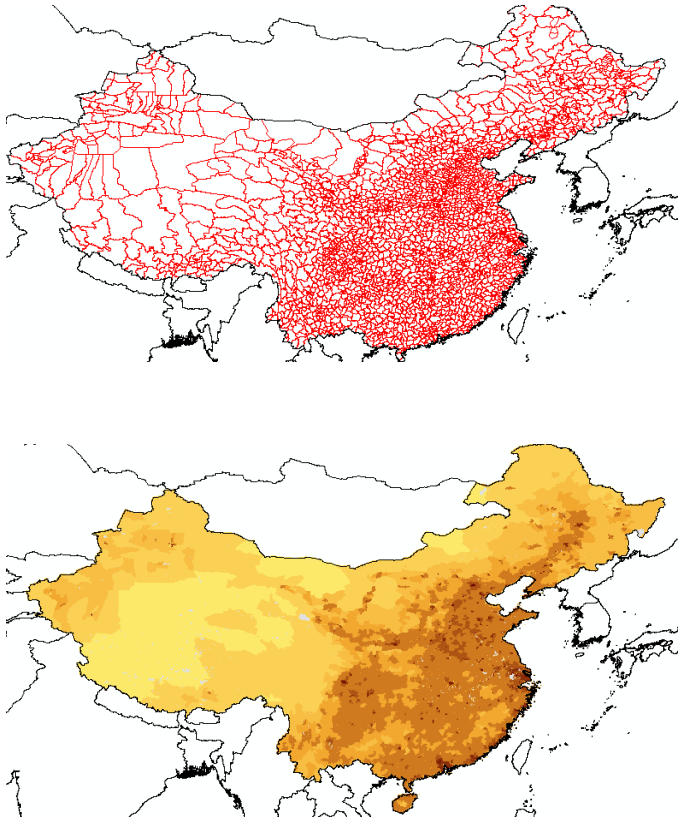
| | GPWv1 | GPWv2 | GPWv3 | GPWv4 |
|---|---|---|---|---|
| **Publication Year** | 1995 | 2000 | 2005 | 2014/2015 |
| **Years of Estimation** | 1994 | 1990, 1995 | 1990, 1995, 2000 | 2000, 2005, 2010, 2015, 2020 |
| **Number of Input Units (subnational geographic units)** | 19,000 | 127,000 | c. 400,000 | ~ 12,500,000 |
| **Grid Resolution** | 2.5 arc-minute | 2.5 arc-minute | 2.5 arc-minute | 30 arc-second (1 km) |
| **Census variables** | Total Population | Total Population | Total Population | Total Population, Sex, Age, Urban/Rural status |

# Methods for GPWv4



# GPW is minimally-modeled

- GPW uses the areal-weighting method
  - Does not incorporate ancillary data (e.g. land use/land cover, transportation networks, elevation, etc.)
  - Distributes population based on land area
- The accuracy of GPW pixel estimate is directly related to the size of the input areal units



Higher resolution boundaries in eastern China lead to more precise pixel estimates

# Characteristics of GPWv4

## Increased spatial resolution of input data

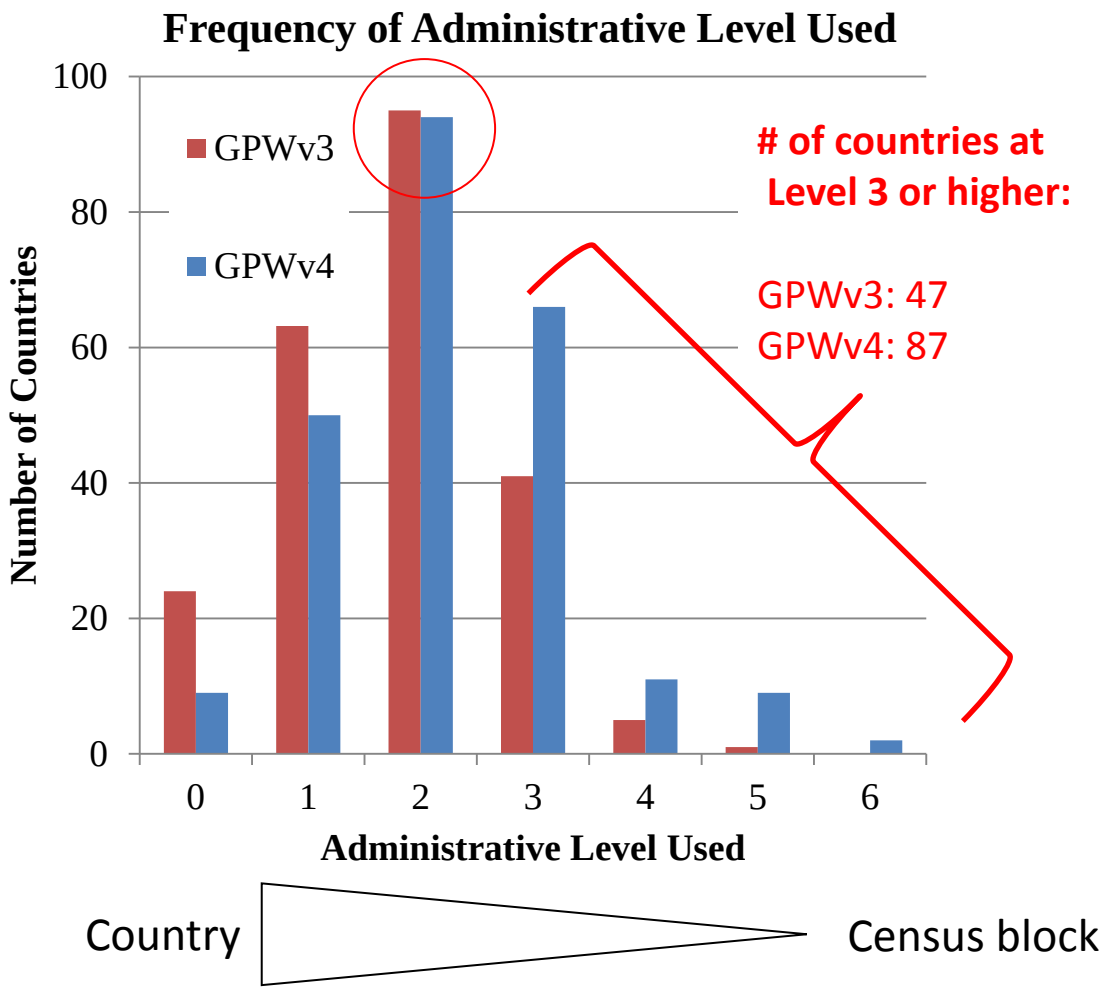
Pixel level accuracy of GPW depends upon the size of the input census units

**Number of Input Census Units**

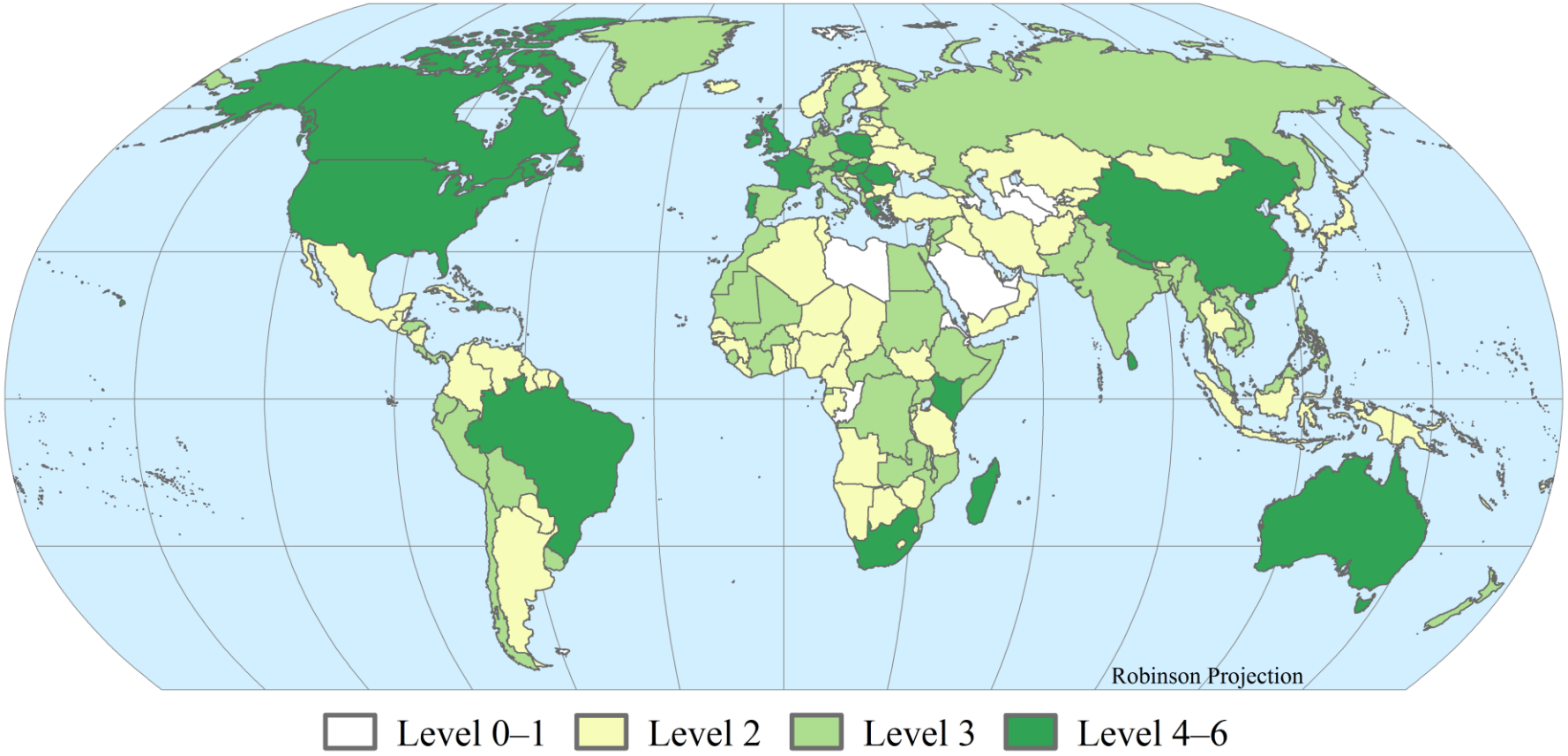
| | GPWv3 | GPWv4 |
|---|---|---|
| Global | 399,747 | 12,497,563 |
| USA | 60,884 | 10,608,747 |
| Outside USA | 338,863 | 1,888,816 |

# Characteristics of GPWv4

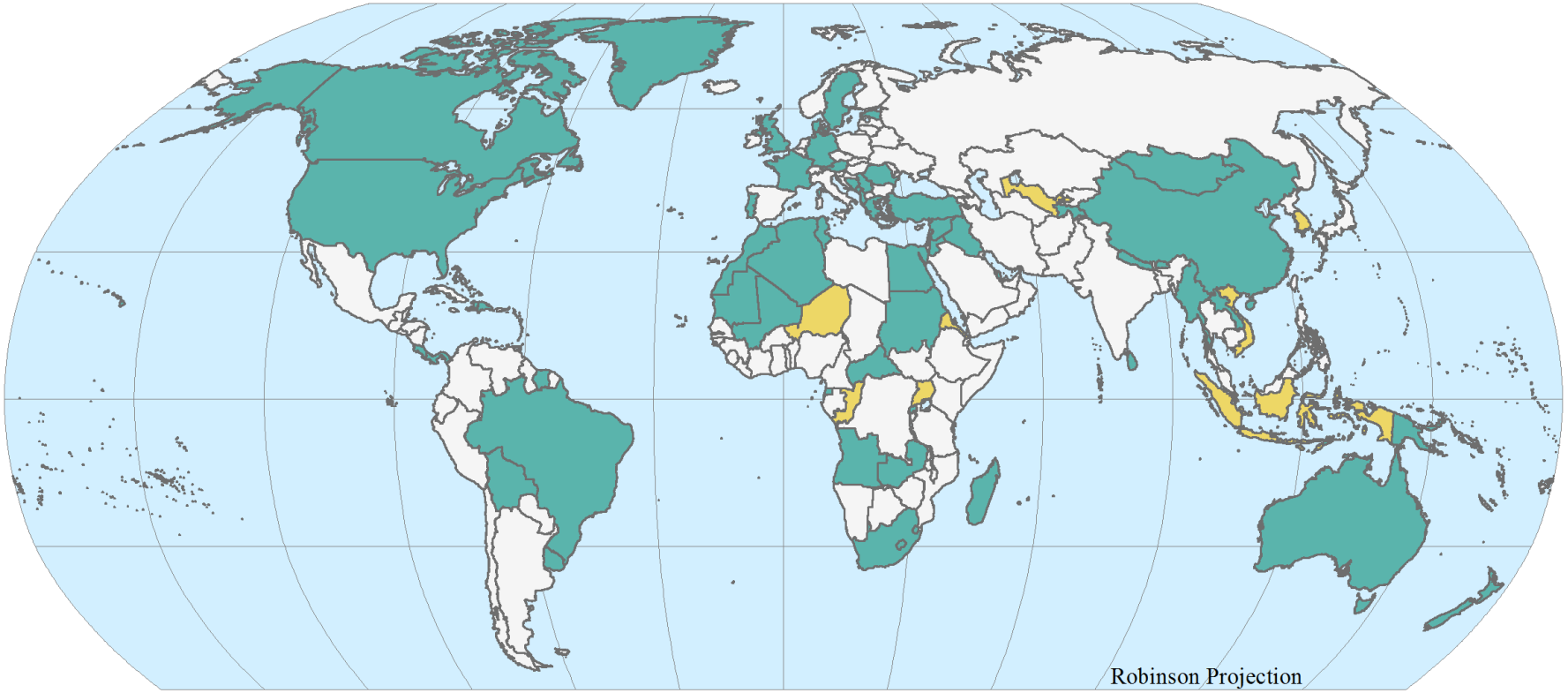
## Leverages greater availability of Census information



# GPWv4 Administrative Level



# Improvements in Input Data Resolution




Lower resolution than GPWv3
11 countries

Same as GPWv3
132 countries

Higher resolution than GPWv3
98 countries

# Characteristics of GPWv4

## Additional census variables

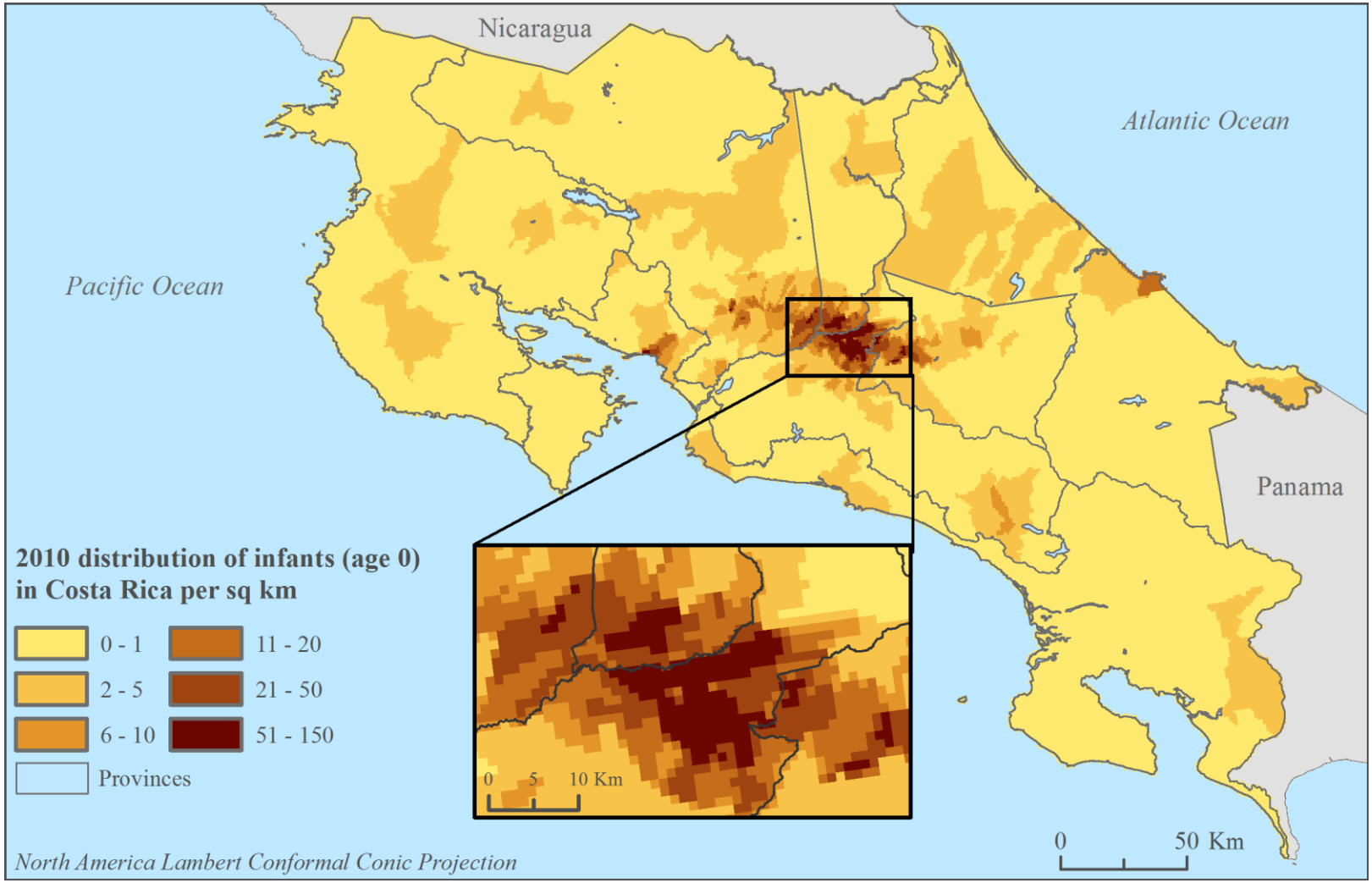
Demographic information in population grids

**GPWv4 will include grids for:**

- Sex
- Age (single year or 5-year age groups)
- Urban/Rural status

# Costa Rica Example

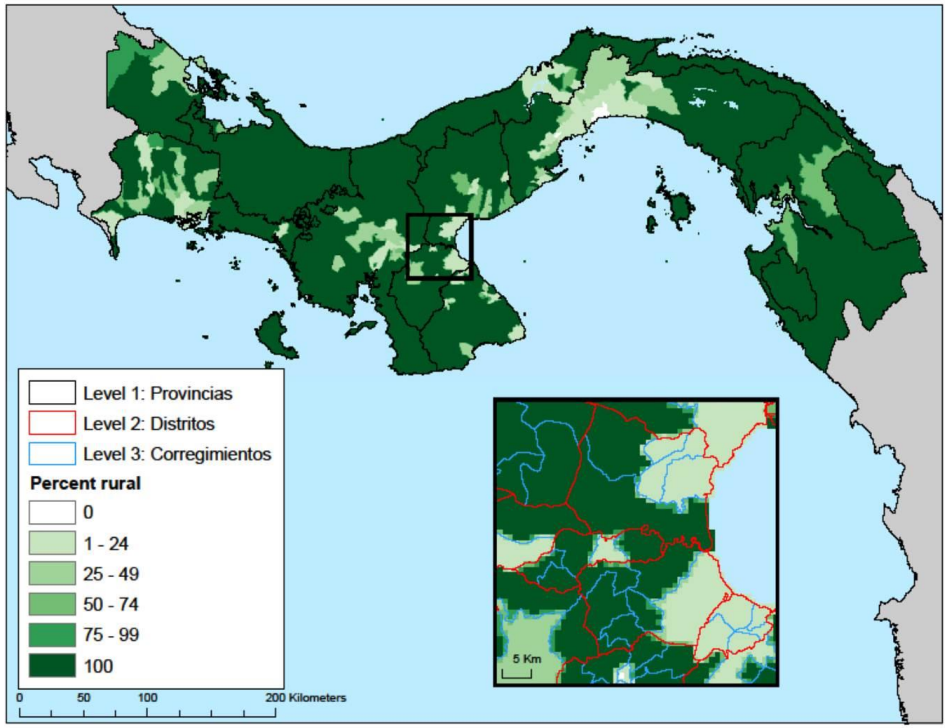
## Concentrations of demographic variables



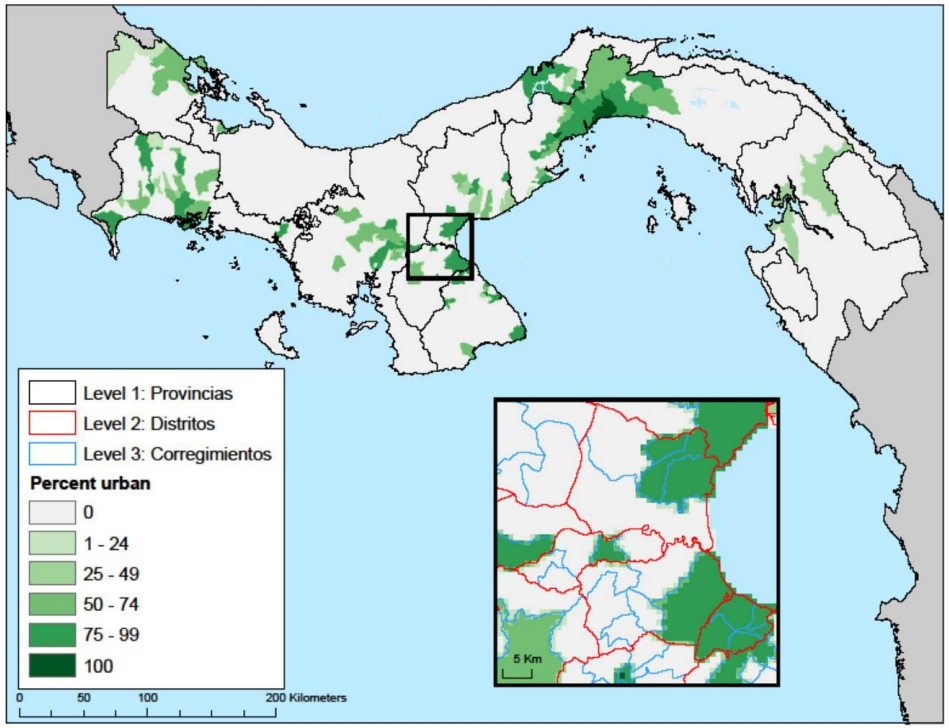
# Panama Example

## Sub-National Urban Rural Fractions

2010 % rural population, Panama




2010 % urban population, Panama



# Challenges with census data and boundaries

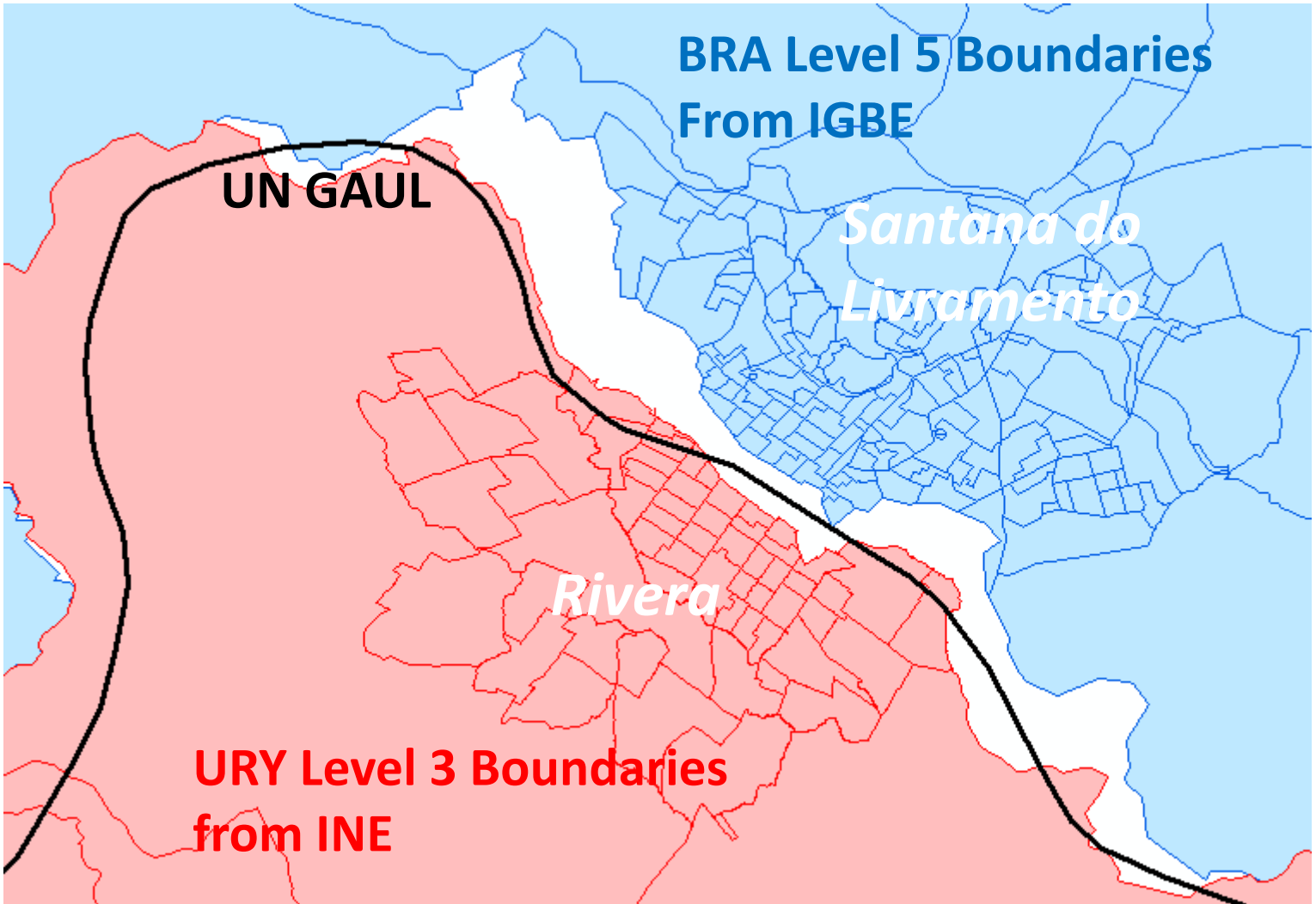
- Room for ongoing improvements with online dissemination
- Asymmetry between availability of tabular census data and census geography
- Significant research required to reconcile census areas with those present in the GIS data and to assign common identifiers

| Primary method of census data dissemination | Percent of respondents (121 countries) |
|---|---|
| Paper publications | 52% |
| Static web pages (html, excel, PDF) | 28% |
| Interactive online databases | 14% |
| CD/DVD | 4% |
| Other | 2% |

Source: 2011/2012 survey for the review of the 2010 World Programme on Population and Housing Censuses; UN Statistics Division, 2013.

# Boundary Integration

- Disagreements without territorial disputes

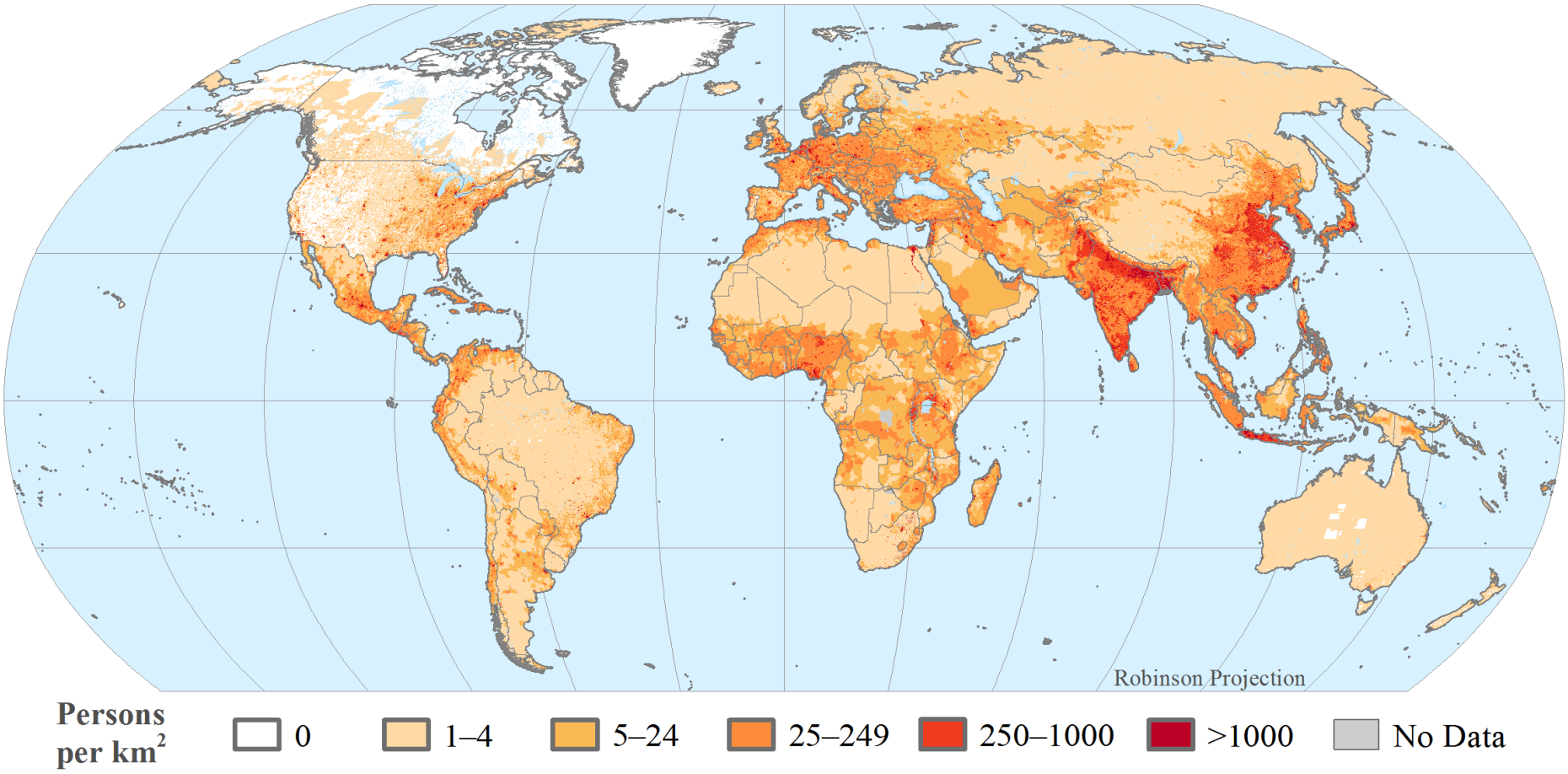


# Future Work

- GPW4 Alpha release of Total Population available soon
- Demographic variables to follow
- Additional datasets quantifying census data quality are in the works

- GPW4 is well suited as an **input**
  - To dasymetric population models
  - To mix with any data that might already be factored in to alternative global pop data products

# GPWv4 2010 Population Density Estimates




Source: CIESIN, 2014