TERRA POPULUS

Integrated Data on Population and Environment

Minnesota Population Center

University of Minnesota Libraries

Institute on the Environment

University of Minnesota
Driven to Discover℠

CIESIN
Columbia University

ICPSR
A partner in social science research

Inter-University Consortium for Political and Social Research

NSF

Workshop Outline

- TerraPop project overview
- Raster to area transformations
- Tutorial 1 – Area-level extract
- Microdata
  - Attaching contextual variables
  - Microdata geography
- Tutorials 2 & 3 – Microdata extract & analysis
- Area to raster transformations
- Tutorial 4 – Mapping TerraPop data (optional)
- Q & A

TerraPop Goals

Lower barriers to conducting interdisciplinary human-environment interactions research by making data with different formats from different scientific domains easily interoperable

Provide an organizational and technical framework to preserve, integrate, disseminate, and analyze global-scale spatiotemporal data describing population and the environment.

TerraPop in Context

Collaborating Organizations

MPC
Minnesota Population Center

- Data integration expertise
- Large census and survey data collections & expertise
- Institutional foundation

- Human-environment interactions research expertise
- Environmentally-oriented data collections & expertise

CIESIN
Columbia University

INSTITUTE ON THE ENVIRONMENT
UNIVERSITY OF MINNESOTA
Driven to Discover℠

- Data preservation and sustainability expertise
- Social science data collections & expertise

ICPSR
A PARTNER IN SOCIAL SCIENCE RESEARCH
INTER-UNIVERSITY CONSORTIUM FOR POLITICAL AND SOCIAL RESEARCH

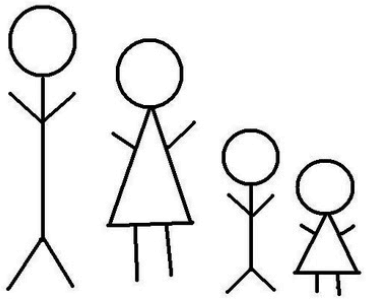
UNIVERSITY OF MINNESOTA
LIBRARIES

- Major producers and distributors of data on both humans and their environment
- Major producers of tools for integrating and transforming data across formats
- Leaders in preservation and sustainability

Source Data

- DOMAINS & FORMATS
- POPULATION MICRODATA
- AREA-LEVEL DATA
- ENVIRONMENTAL DATA

Making disparate data formats interoperable

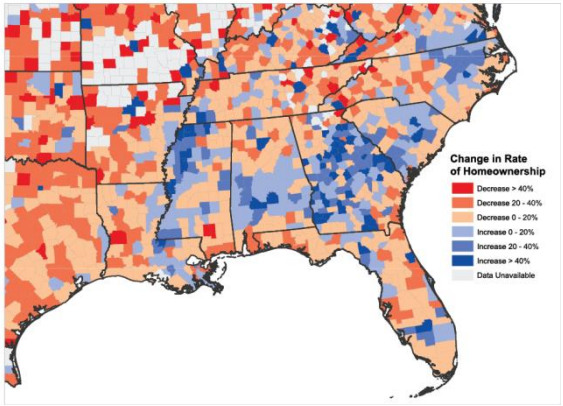


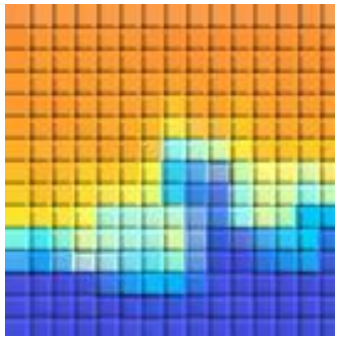
Microdata:

Characteristics of individuals and households

Area-level data:

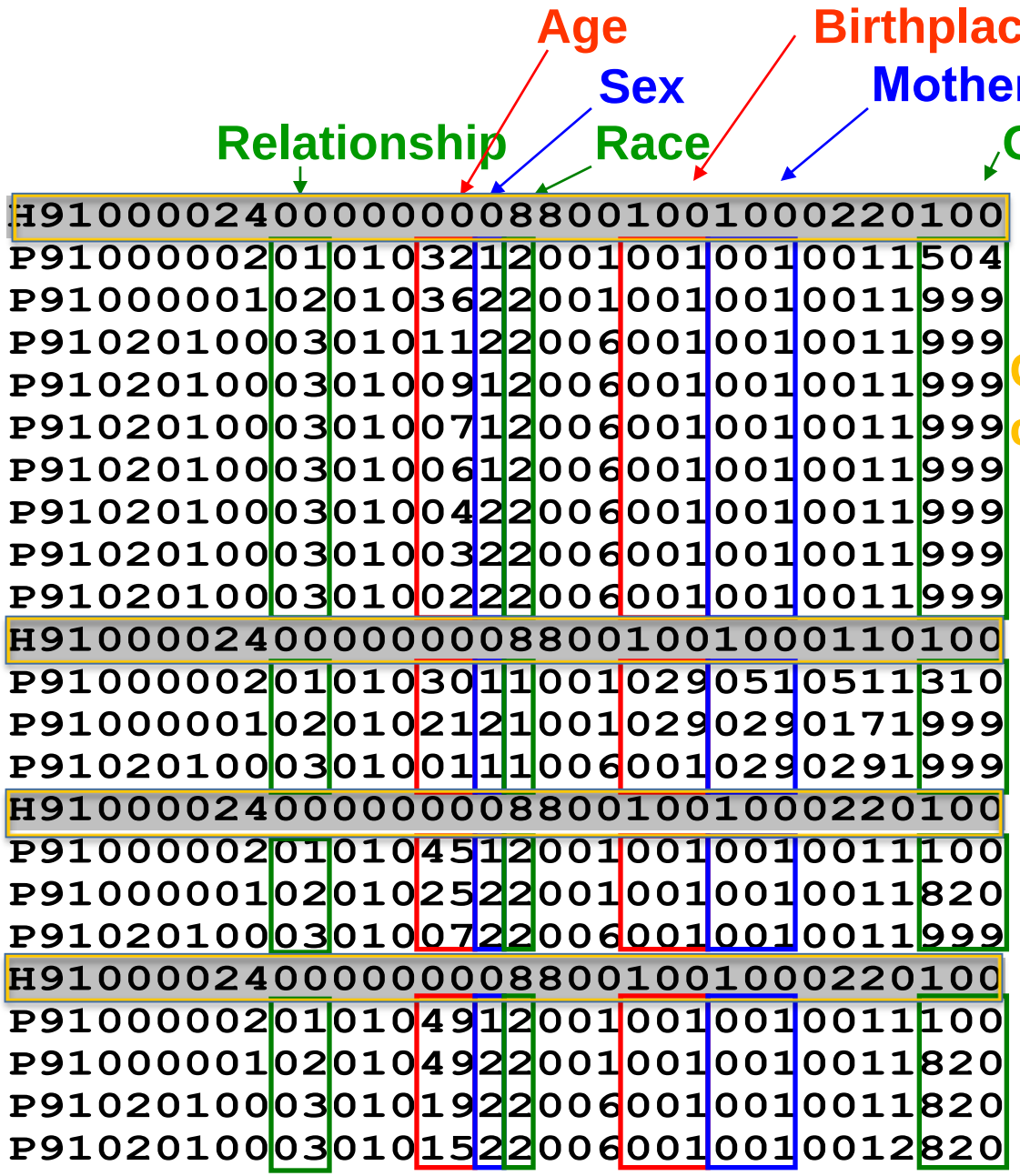
Characteristics of places defined by boundaries





Raster data:

Values tied to spatial coordinates

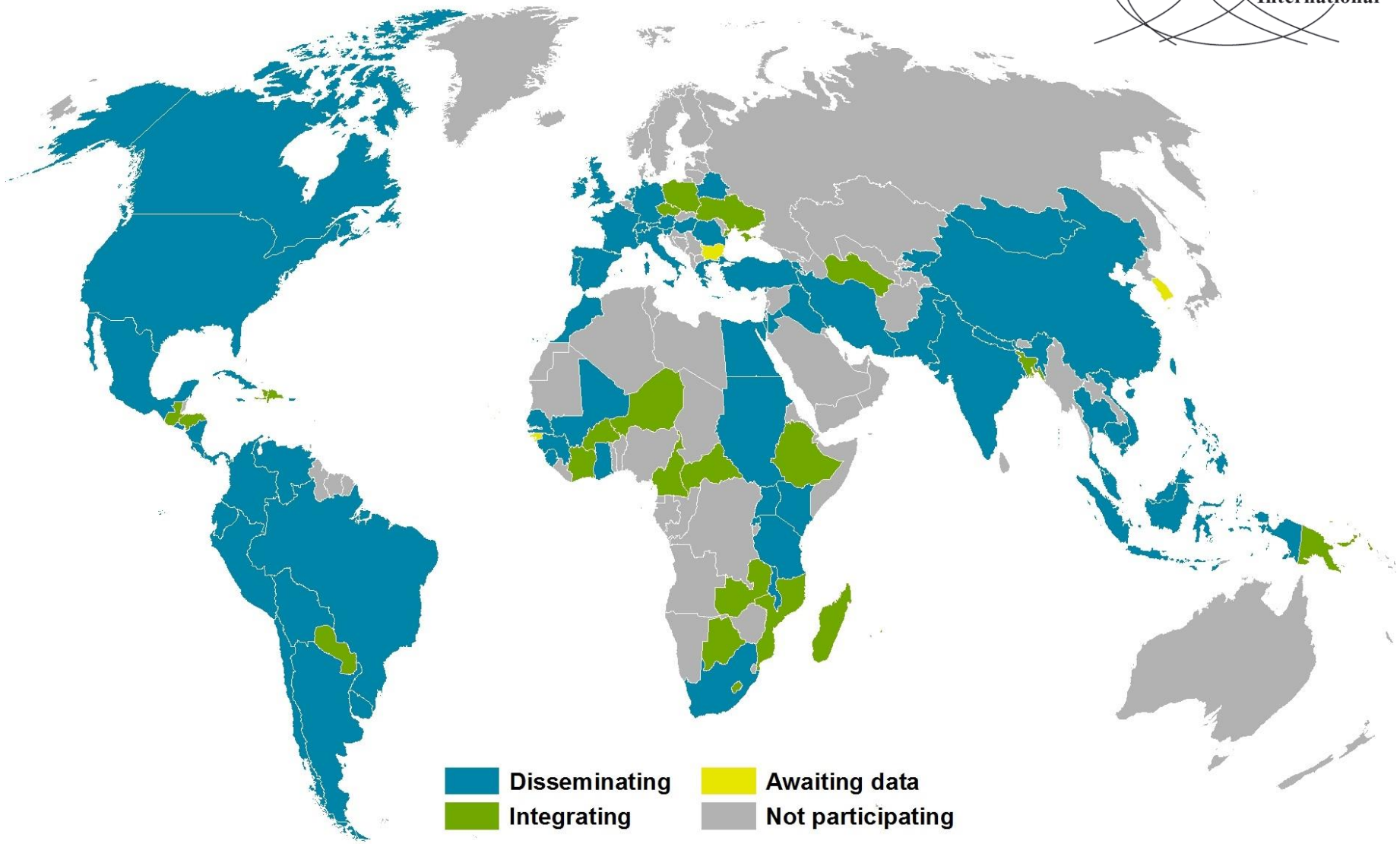


Population Microdata Structure

Geographic and housing characteristics

- Rows
  - Household records
  - Person records within households
- Columns
  - Variables

Microdata Availability

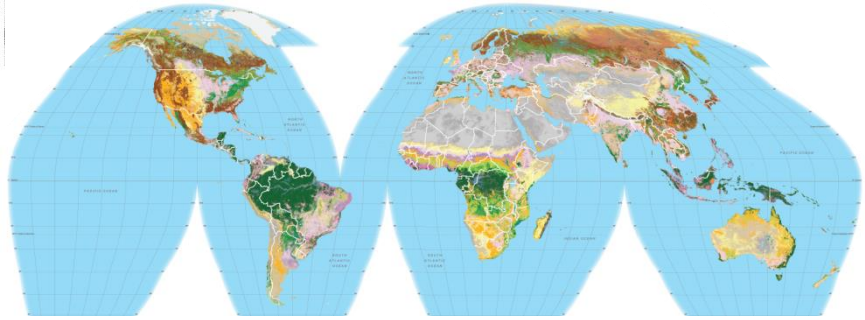


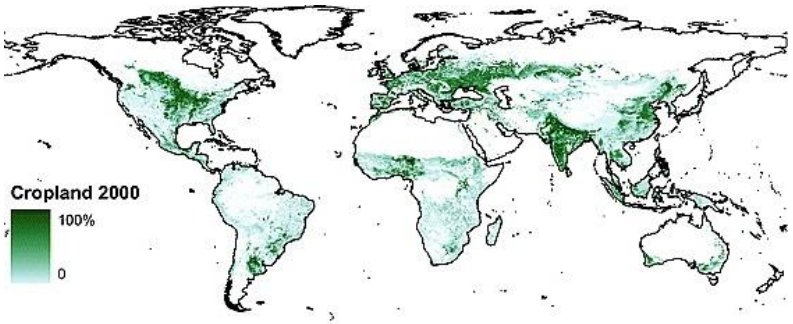
Area-level Data Sources

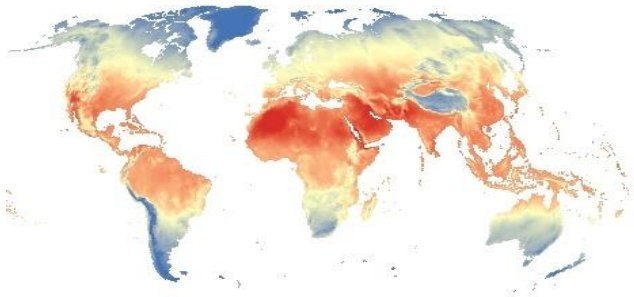
- Census tables, especially where microdata is unavailable
- Other types of surveys, data
  - Agricultural surveys
  - Economic surveys, data
  - Election data
  - Health data
- Legal/policy information

Environmental Data

- Beta system
  - Global Land Cover 2000
  - Harvested Area and Yield for 175 crops *(Global Landscapes Initiative)*
  - Temperature and precipitation *(WorldClim)*
- Future additions
  - Additional LU/LC and climate datasets
  - Elevation
  - Vegetation characteristics
  - Bioclimatic & ecologic zones





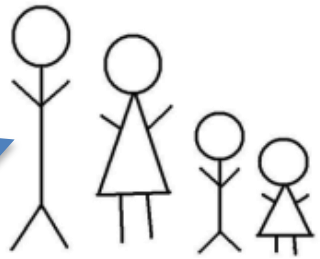


Location-Based Integration

MICRODATA ⇔ AREA-LEVEL ⇔ RASTER

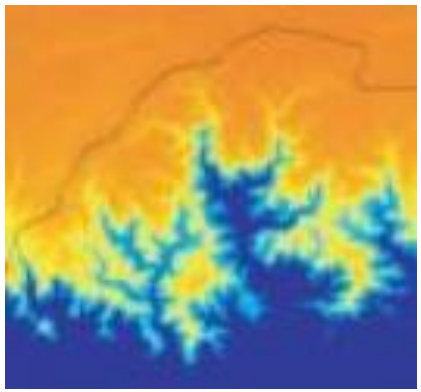
Location-Based Integration

Microdata

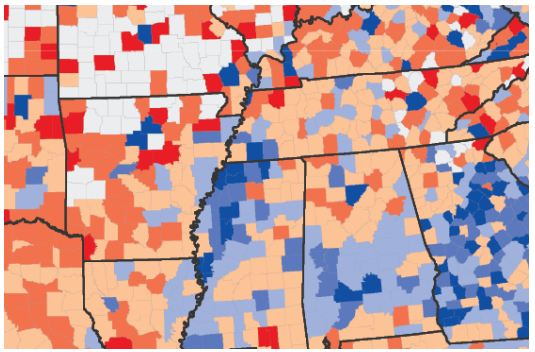


Mix and match variables originating in any of the data structures

Obtain output in the data structure most useful to you



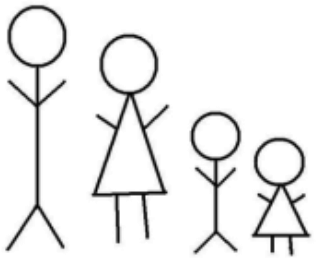
Rasters



Area-level data

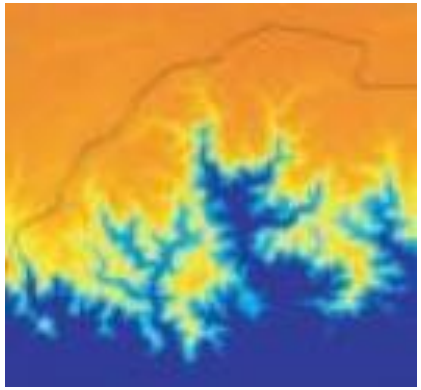
Location-Based Integration

Microdata



Individuals and households with their environmental and social context

AGE	SEX	LANDCOV	AVGTEMP
10	Male	Forest	21.20
27	Female	Forest	24.30
54	Female	Pasture	24.10
37	Male	Cropped	25.60
37	Female	Cropped	28.10
42	Female	Urban	26.70
20	Female	Forest	24.30
39	Male	Urban	26.80
77	Female	Cropped	27.70
11	Female	Cropped	22.30
31	Female	Pasture	25.10
23	Male	Forest	24.40
24	Female	Urban	21.50
40	Female	Urban	23.40



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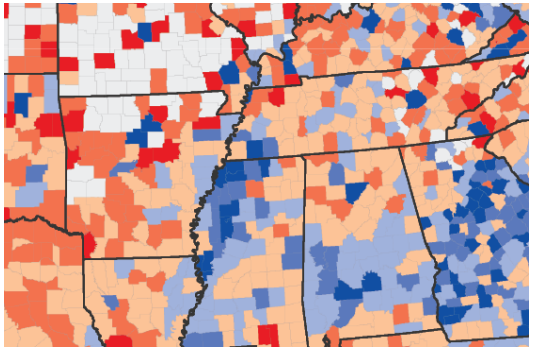
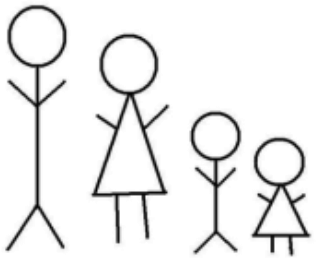


Area-level data

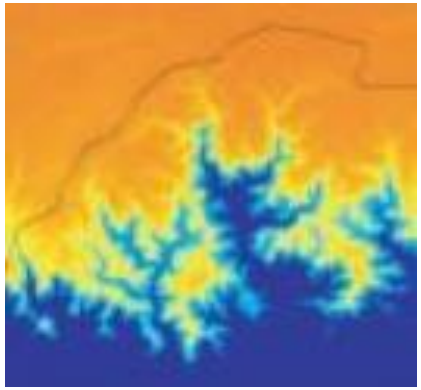
Location-Based Integration

Microdata

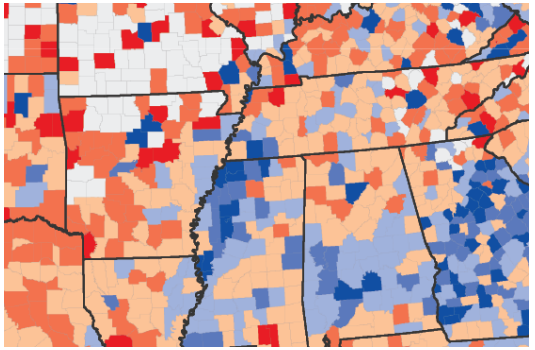


County ID	Avg. Ann. Temp.	Avg. Ann. Precip.	Rent, Rural	Rent, Urban	Own, Rural	Own, Urban
G17003100001	21.2	768	3129	1063	637	365
G17003100002	23.4	589	2949	1075	1469	717
G17003100003	24.3	867	3418	1589	1108	617
G17003100004	21.5	943	1882	425	202	142
G17003100005	24.1	867	2416	572	426	197
G17003100006	24.4	697	2560	934	950	563
G17003100007	25.6	701	2126	653	321	215

Summarized environmental and population characteristics for administrative districts



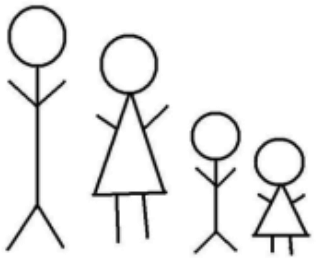
Rasters



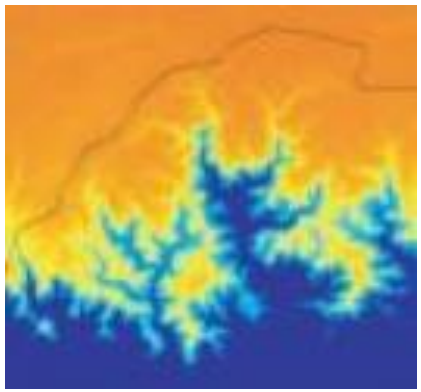
Area-level data

Location-Based Integration

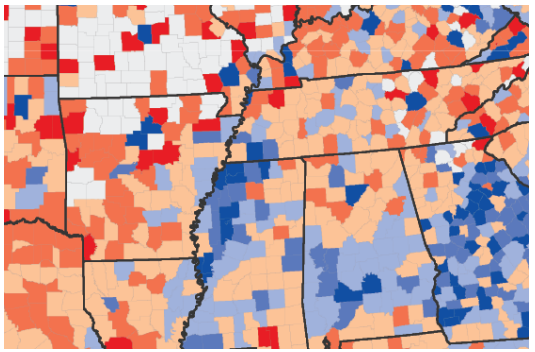
Microdata



Rasters of population and environment data



Rasters

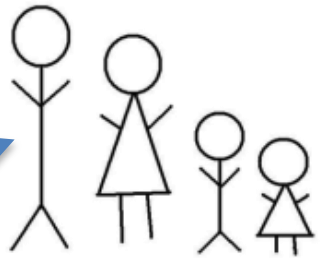


Area-level data

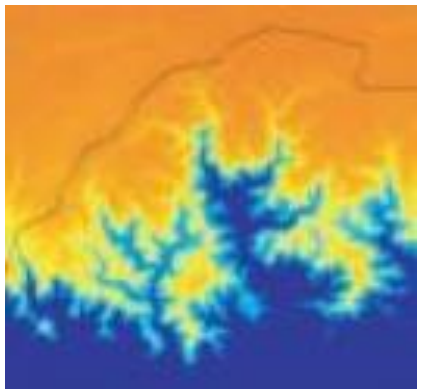
Current Status & Future Plans

Transformations Supported in Beta

Microdata



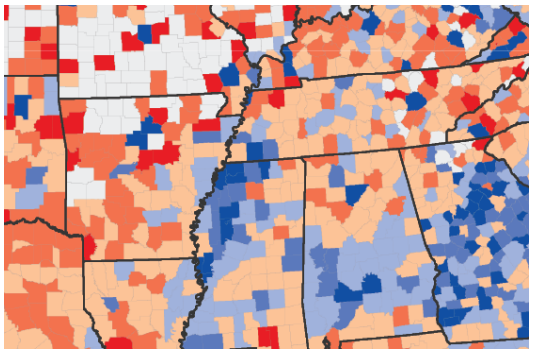
Attach contextual variables to microdata



Rasters

Distribute area-level data to grid cells

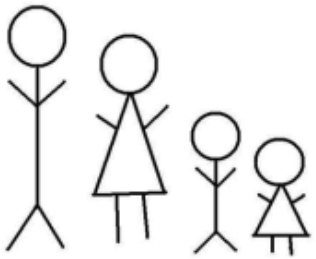
Summarize raster data to area-level



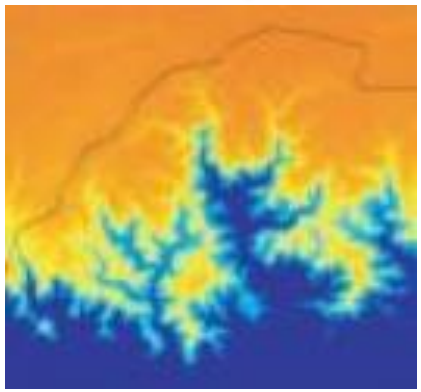
Area-level data

Transformations in future releases

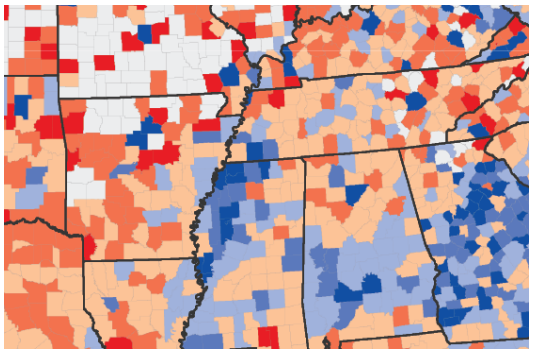
Microdata



Custom microdata tabulations, delivered as area-level or raster



Rasters



Area-level data

TerraPop Beta - Microdata

Samples			
Argentina 1970	Brazil 1980	Malawi 1998	Vietnam 1989
Argentina 1980	Brazil 1991	Malawi 2008	Vietnam 1999
Argentina 1991	Brazil 2000		Vietnam 2009
Argentina 2001		USA 1980	
Argentina 2010	Spain 1991	USA 1990	
	Spain 2001	USA 2000	
		USA 2010	

TerraPop Beta – Area-level Data

Samples			
Argentina 1970	Brazil 1980	Malawi 1998	Vietnam 1989
Argentina 1980	Brazil 1991	Malawi 2008	Vietnam 1999
Argentina 1991	Brazil 2000		Vietnam 2009
Argentina 2001		USA 1980	
Argentina 2010	Spain 1991	USA 1990	
	Spain 2001	USA 2000	
		USA 2010	

TerraPop Beta - Raster

Datasets	
Land cover	Global Land Cover 2000
Land use	Harvested Area and Yield for 175 crops (Global Landscapes Initiative)
Climate	Temperature, precipitation and bioclimactic variables from WorldClim

Planned Additions

- Remaining microdata samples from IPUMS-International
- Area-level census data for the United States
  - National Historical Geographic Information System Time Series Tables for states and counties
- Area-level census data for countries not in IPUMS-International

Planned Additions

- Land cover
  - MODIS MCD12Q1 annual land cover data
  - Globcover
  - MODIS Vegetation Continuous Fields
- Land use
  - MODIS 500m Map of Global Urban Extent
  - Global Land Use Dataset (5 classes)

Timeline

- Beta access system is currently available for users at https://beta.terrapop.org
- Mid to late summer 2014 – NHGIS-derived aggregate US census data and MODIS land cover (2001-2012) available in TerraPop
- Fall 2014 – remainder of IPUMS-International collection available in TerraPop
- 2015-2016 – Incorporation of additional data, microdata tabulation functionality, other enhancements

Data Access System

DEMO VIDEO – AREA-LEVEL DATA EXTRACT

Contact

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