



**SUSTAINABLE  
DEVELOPMENT  
GOALS**

# Why We Need Both Geography & Data Science to Achieve Sustainable Development

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*UN Sustainable Development Solutions Network*



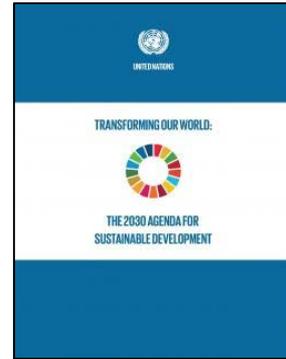
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# The UN General Assembly Adopted the 2030 Agenda for Sustainable Development in September 2015, including 17 Sustainable Development Goals



# Transforming Our World & Leaving No One Behind

4. As we embark on this great collective journey, we pledge that **no one will be left behind**. Recognizing that the dignity of the human person is fundamental, we wish to see the Goals and targets met for **all nations and peoples and for all segments of society**. And we will endeavour to **reach the furthest behind first**.
48. Indicators are being developed to assist this work. **Quality, accessible, timely and reliable disaggregated data** will be needed to help with the measurement of progress and to ensure that no one is left behind. Such data is key to decision-making.
- 17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of **high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts**



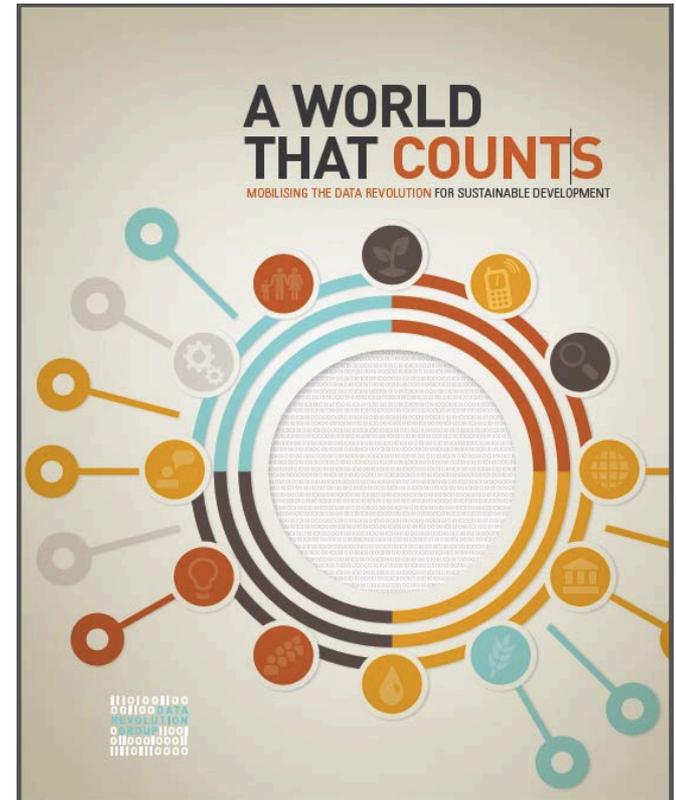
(emphasis added)

<https://sustainabledevelopment.un.org/post2015/transformingourworld>

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# Recognition of the Role of the Data Revolution in Sustainable Development

- ▶ The data revolution is already happening:
  - New technologies leading to **exponential increase in volume and types of data available**
  - **Much greater demand for data from all sides**
  - Governments, companies, researchers and citizen groups are in a ferment of **experimentation, innovation and adaptation**
- ▶ **A huge opportunity to enable and accelerate sustainable development**



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GROUP 11001  
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**DATA REVOLUTION GROUP**

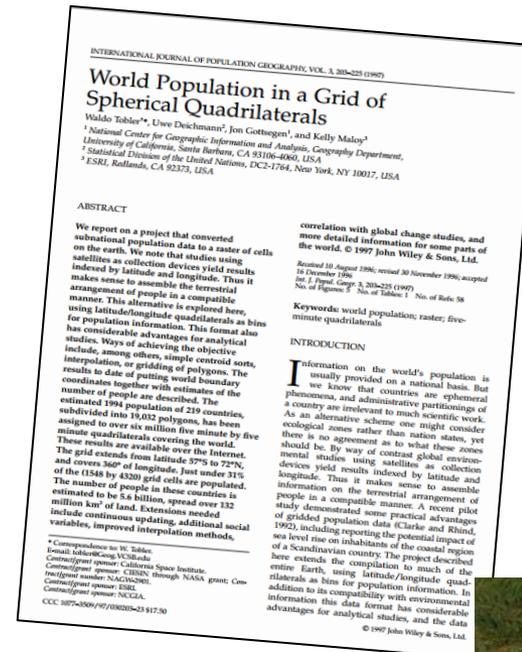
<http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf>

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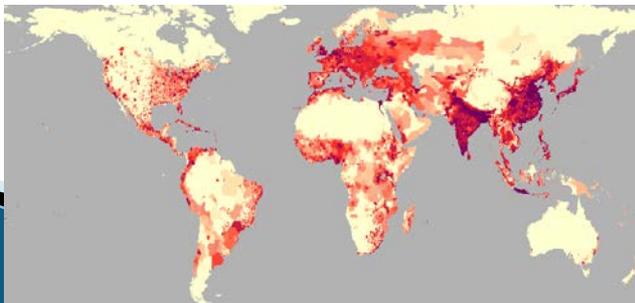


# The First Global Gridded Population Dataset, GPWv1

- ▶ 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)
- ▶ Produced by Waldo Tobler, Uwe Deichmann, Jon Gottsegen, and Kelly Maloy at UC-Santa Barbara



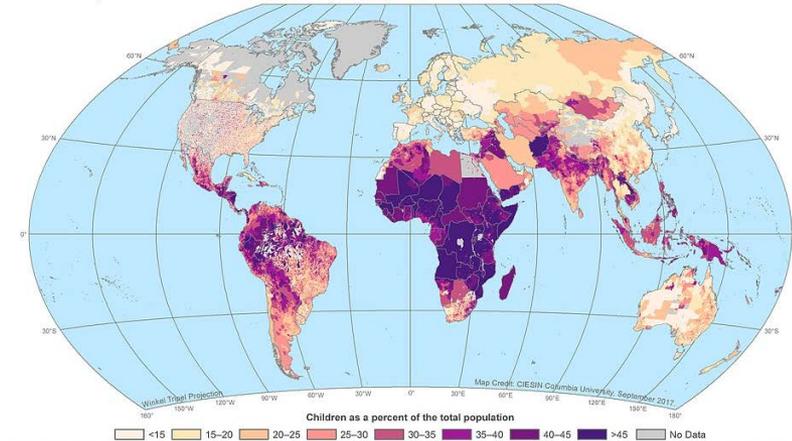
Waldo Tobler, 1930-2018



# GPWv4.10, Population by Age Group & Gender, 2010

## Basic Demographic Characteristics, v4.10, 2010: Children (Ages 0–14)

Gridded Population of the World, Version 4 (GPWv4)



Gridded Population of the World, Version 4 (GPWv4) Basic Demographic Characteristics, Revision 10 consists of estimates of human population by age and sex, consistent with national censuses and population registers, for the year 2010. The global distribution of children, ages 0–14, is represented here as a percent of the total population in the year 2010. It is calculated by summing the counts in the v4.10 5-year age group rasters from ages 0 to 14, then dividing the sum by the total population in the year 2010 and multiplying the quotient by 100.

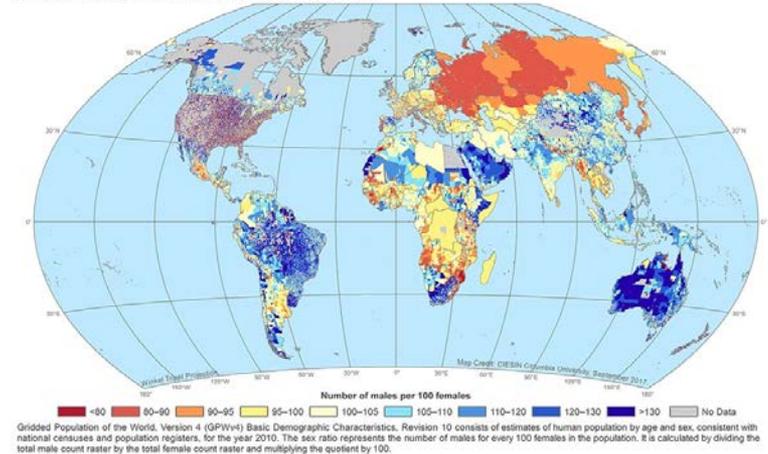
Center for International Earth Data Source: Center for International Earth Science Information Network - CIESIN - Columbia University, 2017. Gridded Population of the World, Version 4 (GPWv4). Science Information Network Basic Demographic Characteristics, Revision 10. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/H4SH7D7F>. EARTH INSTITUTE | COLUMBIA UNIVERSITY

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## Basic Demographic Characteristics, v4.10, 2010: Sex Ratio

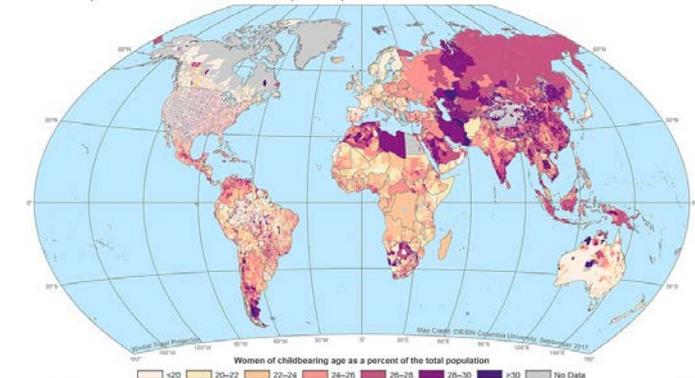
Gridded Population of the World, Version 4 (GPWv4)



Gridded Population of the World, Version 4 (GPWv4) Basic Demographic Characteristics, Revision 10 consists of estimates of human population by age and sex, consistent with national censuses and population registers, for the year 2010. The sex ratio represents the number of males for every 100 females in the population. It is calculated by dividing the total male count raster by the total female count raster and multiplying the quotient by 100.

## Basic Demographic Characteristics, v4.10, 2010: Women of Childbearing Age (Ages 15–49)

Gridded Population of the World, Version 4 (GPWv4)



Gridded Population of the World, Version 4 (GPWv4) Basic Demographic Characteristics, Revision 10 consists of estimates of human population by age and sex, consistent with national censuses and population registers, for the year 2010. The global distribution of women of childbearing age, ages 15–49, is represented here as a percent of the total population in the year 2010. It is calculated by summing the counts in the v4.10 female 5-year age group rasters from ages 15 to 49, then dividing the sum by the total population in the year 2010 and multiplying the quotient by 100.

GPWv4.10 now Includes new dataset on Basic Demographic with gridded estimates of population by age groups and gender for 2010

<http://sedac.ciesin.columbia.edu/data/collect/union/gpw-v4/sets/browse>



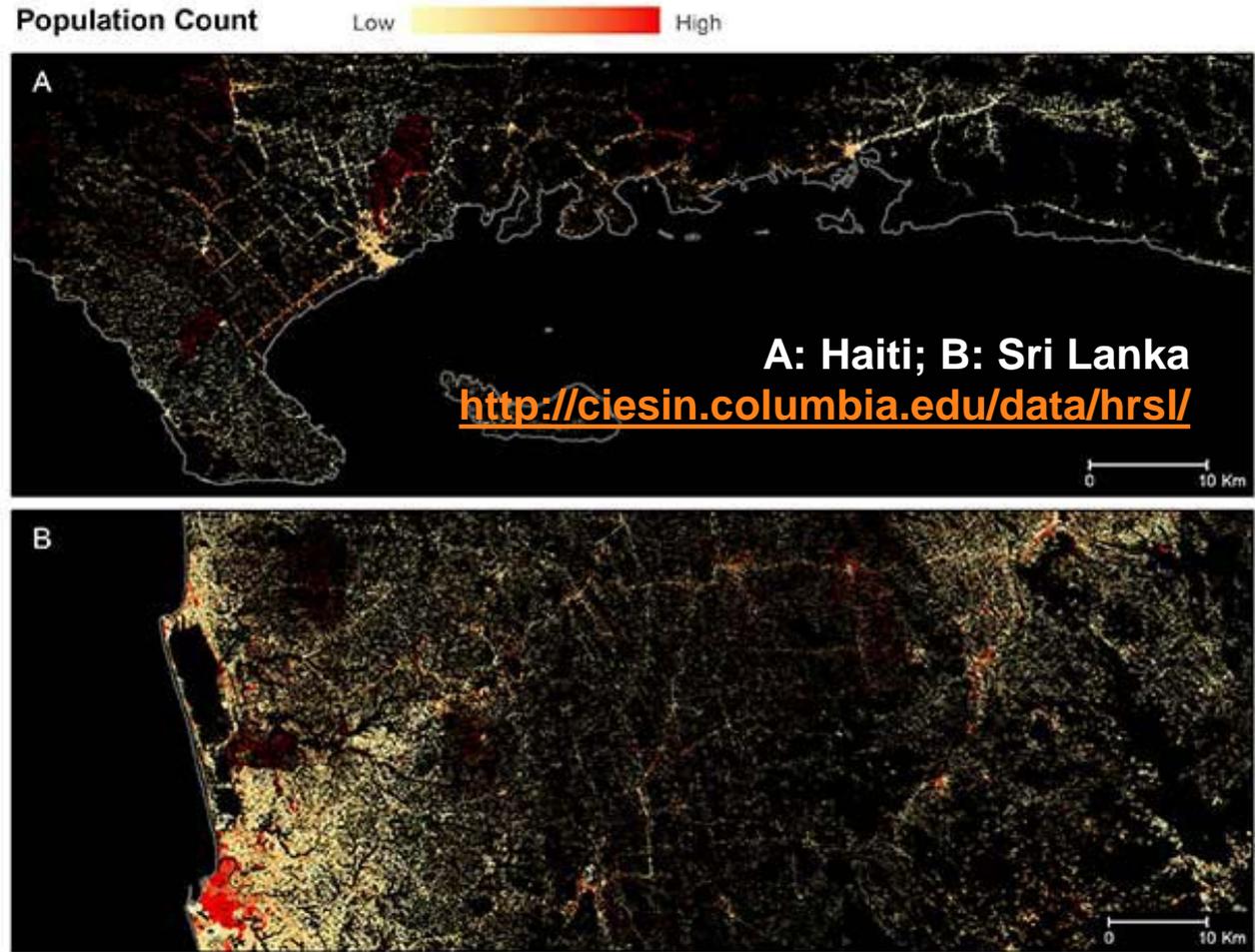
# Diversity of Products with Different Characteristics

Project	Prop. Allocation	Dasymetric	Statistical / machine learning	Multiple Time Points	Imagery / spectral data	Radar	Nominal Spatial Resolution
GPW	✓			✓			1 km
Landscan		✓	✓	✓	✓		1 km
WorldPop			✓	✓ *			100m
GHSL		✓	✓	✓	✓		30m, 250m, 1 km
GUF		✓	✓			✓	~12m for scientific research ~84m public
Esri		✓					250m
HRSL			✓		✓		30m
GMIS/HBASE			✓		✓		30 m

\* Exists for some countries, planned for WorldPop Global

# Mapping Populations in Rural Areas

- ▶ High Resolution Settlement Layer (HRSL): Focus on rural population to optimize Internet access
- ▶ Collaboration with Internet.org/Facebook to produce open access 30-m resolution population density estimates: based on high res remote sensing imagery (IKONOS)
- ▶ Data for 23 countries plus Puerto Rico released; others to be released soon.



# Development of Integrated Spatio–Temporal Data and Models of Human Settlement & Infrastructure

- ▶ Human settlements and infrastructure are a dynamic, integrated system, dependent on environmental conditions and ecological services, and managed by people!
  - People live and work in infrastructure
  - Households, communities invest in, expand, and maintain infrastructure
  - Vulnerability to disaster, climate change, pollution, etc. depends on infrastructure
  - Sustainability of infrastructure (physical, economic, social) depends on environmental conditions and ecological services, and their variability
  - Key subsystems related to energy, water, transportation, sanitation, communications, etc. need to work together
  - Infrastructure is a critical economic asset, essential to future income generation and sustainable development

# POPGRID: A “Data Collaborative” for Settlement, Infrastructure, and Population Data

- ▶ Public-private data partnership involving intergovernmental organizations, national & academic research institutions, large and small companies, NGOs, foundations, universities, data stewards, etc.
- ▶ Goal: Accelerate the development and use of high quality, highly usable georeferenced data on population, human settlements, and infrastructure.



# Participation Welcome!

- ▶ **POPGRID Web Site**  
<http://www.popgrid.org>
- ▶ **POPGRID Google Group**  
<https://groups.google.com/forum/#!forum/popgrid>
- ▶ **GEO Human Planet Initiative**  
<https://www.earthobservations.org/activity.php?id=119>
- ▶ **GEO Symposium 2018**, June 11-12, 2018,  
Geneva, Switzerland
- ▶ **UN World Data Forum**, October 22-24, 2018,  
Dubai, UAE
- ▶ **GEO XVI Plenary**, October 29-November 1,  
2018, Kyoto, Japan
- ▶ **International Data Week**, November 5-8, 2018,  
Gaborone, Botswana
- ▶ **American Geophysical Union**, December 10-  
14, 2018, Washington DC



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