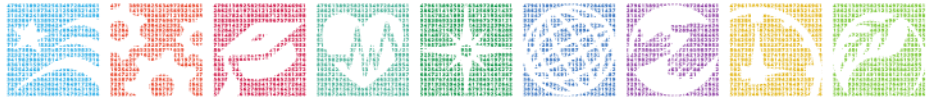


IPUMS



IPUMS Training and Development: Requesting Terra Data as Raster



Raster Exercise

Objective: Use IPUMS Terra to obtain customized datasets that can be used to answer research questions. This exercise uses raster datasets to explore education and agriculture in two economically different countries.

IPUMS Terra: Raster Data Extract Overview

RESEARCH QUESTIONS

Question 1

Examine relationships between education and agriculture in Zambia and Switzerland. Is there a correlation between educational attainment levels and crop/pasture land use in each country? Is the relationship similar across the two countries?

Question 2

Examine the tree cover present in Zambia and Switzerland. How does population relate to the presence of broadleaved trees? Compare relationships in both countries, for evergreen and deciduous broadleaved trees where applicable.

OBJECTIVES

- Create an IPUMS Terra account
- Create and download an IPUMS Terra raster data extract
- Use IPUMS Terra to rasterize area-level data

IPUMS TERRA VARIABLES

Area-level variables

POPTOTAL:	Total population for tabulated census areas
EDATTAIN:	Percent of population with a specific level of educational attainment in each census area

Raster variables

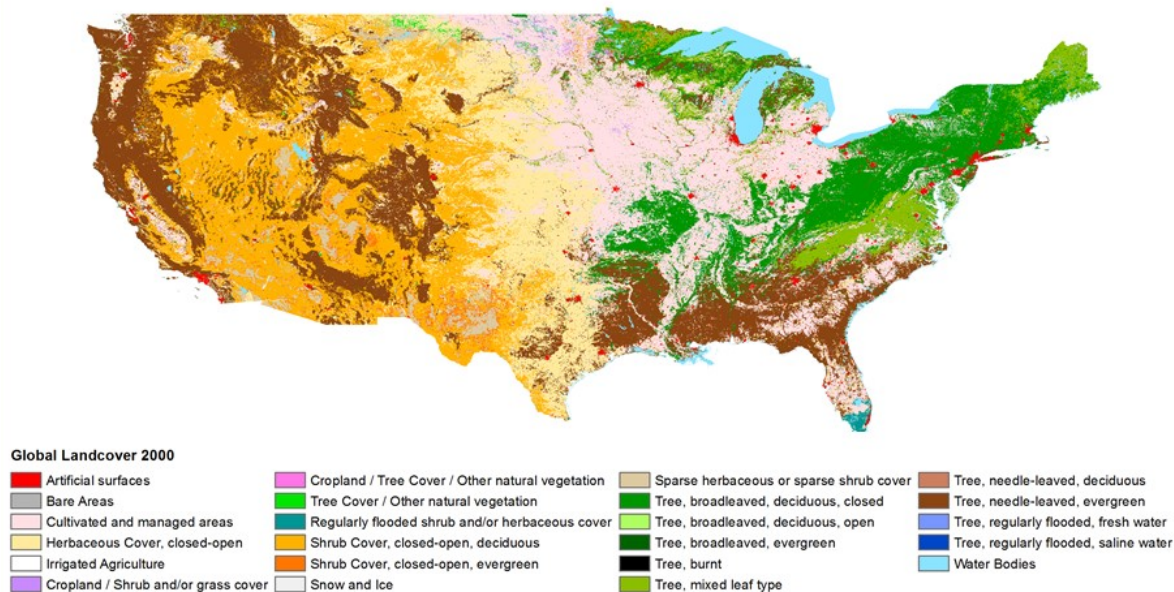
CROPLAND2000:	Area used as cropland
PASTURE2000:	Area used as pasture
LCBRDEVGRN:	Tree Cover, Broadleaved, Evergreen
LCDECIDCL:	Tree Cover, Broadleaved, Deciduous, Closed
LCDECIDOP:	Tree Cover, Broadleaved, Deciduous, Open

IPUMS Terra: Raster Data Extract Overview

Data Type Descriptions

Raster

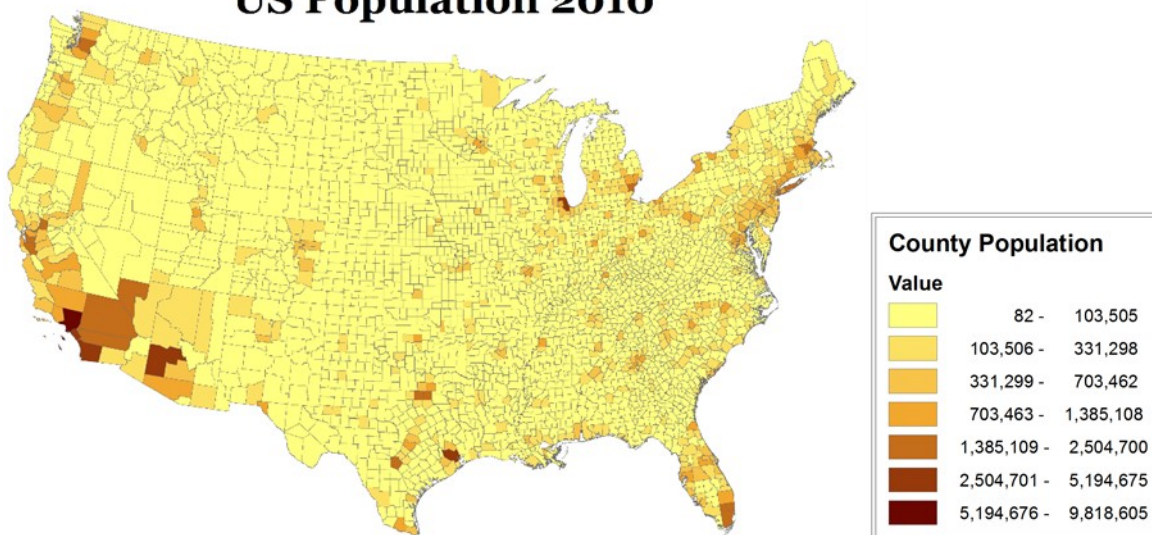
Raster data describe how the value of a variable varies over space. The data are structured as a grid of cells. Each cell is connected to a location, and contains the value of the variable at that location. For example, in a land cover raster, each cell indicates the type of land cover found at that location.



Area-level

Area-level data describe geographic units defined by boundaries. Units are grouped in sets, such as the counties of the United States or the states of Brazil. In IPUMS Terra, these sets of units are referred to as geographic levels. The data are structured as tables, with a row for each unit and a column for each variable. For example, you may have a table with a row for each county in the United States and columns containing the number of males and the number of females in each county.

US Population 2010

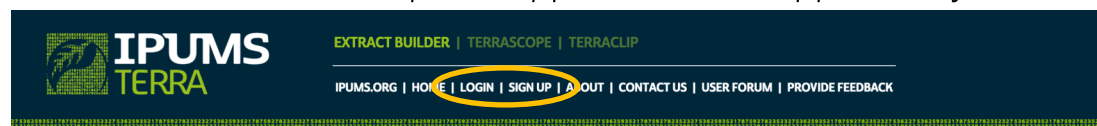


Step 1 Sign up

IPUMS uses a common user management system covering all IPUMS products. If you have an existing account with any IPUMS product, you will use the same account for IPUMS Terra.

- Go to <https://data.terrapop.org/>
- If you have an existing IPUMS account, click **Login**. After logging in, you will be directed to the registration page for IPUMS Terra.
- If you do not have an IPUMS account, click on **Sign up** to register for access.

Note: Microdata access is NOT required for this exercise. Access to international microdata requires application and approval by the



What is IPUMS Terra?

IPUMS Terra integrates the world's population and environmental data including...

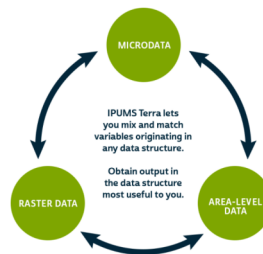
- Population censuses and surveys
- Land cover data classified from satellite imagery
- Temperature, precipitation, and related climate data
- Land use data derived from censuses and surveys in combination with remotely sensed data

Available Datasets

- Microdata Datasets
- Area-level Datasets
- Raster Datasets

Tutorials

- Microdata Output
- Area-level Output



Microdata Output

characteristics of individual people with attached contextual variables derived from area-level and/or raster data

[Start Extract](#)

Area-level Output

characteristics of geographic units including aggregate population data and/or summaries from raster data

[Continue Extract](#)

Raster Data Output

data in spatial grids potentially derived from area-level data

[Start Extract](#)

Step 2 Email confirmation and log in

After you have registered with IPUMS Terra, an e-mail will be sent to your account notifying you of approval.

Note: Please be sure to check your trash/spam folders

- Open the e-mail and click on the confirmation link. You will then be logged into IPUMS Terra.

Step 3
Start a
raster
extract

The extract builder website guides researchers through the workflows for building data extracts. Choose the type of data structure you would like to receive as output for further analysis. In this tutorial, we will get raster data output.

- Click on the *Start Extract* button for Raster Data Output

The screenshot displays three distinct output options, each presented in a light green rectangular box. Each box contains a title, a descriptive paragraph, a 'Read more' link, and a 'Start Extract' button. The 'Raster Data Output' option is highlighted with a yellow circle around its button.

Output Type	Description	Action
Microdata Output	characteristics of individual people with attached contextual variables derived from area-level and/or raster data Read more	Start Extract
Area-level Output	characteristics of geographic units including aggregate population data and/or summaries from raster data Read more	Start Extract
Raster Data Output	data in spatial grids potentially derived from area-level data Read more	Start Extract

Step 4

Examine the IPUMS Terra interface

The IPUMS Terra interface for the first step of the workflow consists of the following elements:

Navigation Bar: Shows the major steps in the workflow, the sub-steps of the current step, and your progress through the workflow. The navigation bar steps will reflect the workflow you select. The step and sub-step you are currently on are highlighted in green.

Data Cart: Provides a summary of the data you have selected to include in your extract. The data cart is updated as you make selections throughout the workflow.

Availability Grid: Shows the availability of variables by dataset and enables selection of variables and datasets.

Variables Panel: Lists topics for which area-level variables are available. Clicking on a topic will populate the rows of the availability grid with the variables in that topic.

Datasets Panel: Lists countries in the IPUMS Terra system, and provides options to filter by time and hide countries without area-level data. Clicking on a continent will list the countries in the continent. Clicking on a country will populate the columns of the availability grid with the datasets available for that country. You may add all countries in a continent to the grid by clicking the “Browse All” line.

The screenshot displays the IPUMS Terra Extract Builder interface. Key components are highlighted with yellow boxes:

- Navigation Bar:** Located at the top, it shows the workflow steps: 1. Rasterize Area-Level Data (highlighted in green), 2. Select Raster Data, 3. Templating Options, and 4. Submit.
- Data Cart:** Located in the top right corner, it shows the current step: 1. Rasterize Area-level Data, with sub-steps for Variables and Datasets.
- Variables Panel:** Located on the left side, it lists various topics such as Birthplace and Nativity, Demographic, Education, Employment, Household Amenities, Household Dwelling Characteristics, Household Economic, and Household Utilities.
- Availability Grid:** Located in the center, it is currently empty and labeled "Browsing None".
- Datasets Panel:** Located on the right side, it lists continents: Africa, Asia, Europe, North America, Oceania, and South America.
- Variables:** A label at the bottom left of the interface.
- Datasets:** A label at the bottom right of the interface.

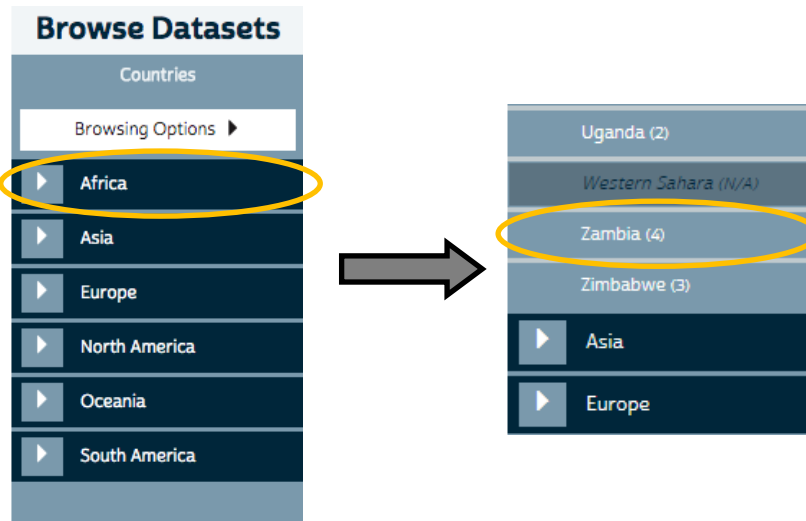
Step 5

Browse datasets for countries of interest

- Click on *Africa* in the Browse Datasets Panel.

Countries are listed alphabetically, with numbers in parentheses indicating how many years of data are available for the country.

- Click on *Zambia*. The available datasets for Zambia appear as columns in the availability grid.



- Click on *Europe* in the Browse Datasets Panel
- Click on *Switzerland*. The available datasets for Switzerland will appear as columns in the availability grid.

- Check the boxes to select year *2000* for both countries.

Step 6

Select datasets

Rasterize Area-level Data

Select Data [What is this?](#)

Show only selected variables ⓘ

Show only selected datasets ⓘ

Variables

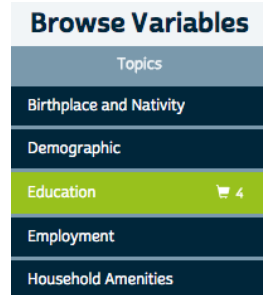
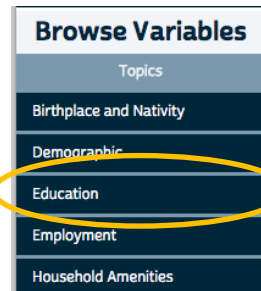
Browsing None

Datasets

Switzerland				Zambia			
1970 IPUMS	1980 IPUMS	1990 IPUMS	2000 IPUMS	1990 IPUMS	2000 IPUMS	2010	2010 IPUMS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Step 7

Select area-level variables



To see available variables, choose a topic in the Browse Variables panel.

- Choose the *Education* topic.

The availability grid will be updated with available education variables.

- Choose the variable group *EDATTAIN*, by checking the multi-select box.

EDATTAIN is available for Zambia and Switzerland in the year 2000. The variables in the EDATTAIN group will be added to your Data Cart.

You can expand the variable group to see the individual variables by clicking the arrow widget

Note: EDATTAIN contains 4 variables for different levels of education.

Note: To hide unselected datasets in each country, click on “show only selected datasets.”

Show only selected variables ⓘ
 Show only selected datasets ⓘ

Education Variables

		Datasets	
		Switzerland	Zambia
<input type="checkbox"/>	SCHOOLAGE (3)	2000 IPUMS <input checked="" type="checkbox"/>	2000 IPUMS <input checked="" type="checkbox"/>
<input type="checkbox"/>	LITAGE (2)		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	EDATTAIN (4 of 4)		
<input checked="" type="checkbox"/>	EDUCLESSPRIM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	EDUCPRIMARY	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	EDUCSECOND	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	EDUCTERTIARY	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	EDYEARS (1)		<input checked="" type="checkbox"/>













- Also select the *POPTOTAL* variable from the *Demographic* category

Step 8

View
variable
metadata

IPUMS Terra also provides metadata about each variable. To access the metadata, you must first expose the individual variables within a variable group.

Demographic Variables

	 POPTOTAL (1)	Total population
	 POPSEX (2)	Population by sex
	 POPAGE (17)	Population by age
	 POPAGEM (17)	Male population by age
	 POPAGEF (17)	Female population by age
	 MARSTSEX (15)	Marital status by sex

- Once the variable group is open, click on the individual variable name *TOTPOP* to get additional metadata (e.g., documentation about the variable, description, availability, and source).

Rasterize Area-level Data

Select Data [What is this?](#)
































Show only selected variables ⓘ

Show only selected datasets ⓘ

Datasets

Switzerland	Zambia
2000 IPUMS 	2000 IPUMS 

Demographic Variables

	 POPTOTAL (1 of 1)	Total population		
	 TOTPOP	Total population		
	 POPSEX (2)	Population by sex		
	 POPAGE (17)	Population by age		
	 POPAGEM (17)	Male population by age		
	 POPAGEF (17)	Female population by age		
	 MARSTSEX (15)	Marital status by sex		
	 FERTILITY (2)	Children ever born, by age of woman		
	 OWNCHILD (1)	Own children in the household		

Step 9

Select raster variables

Before moving on to the next step, verify that your Data Cart has the correct number of variables and datasets.

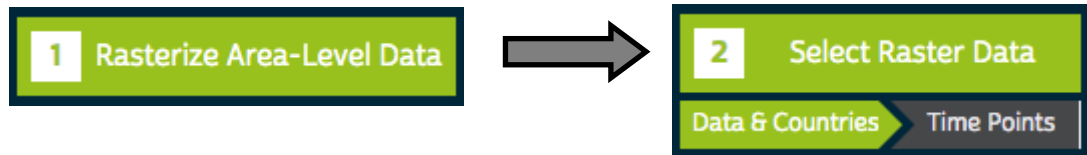
Raster Extract		Cancel
1	Rasterize Area-level Data	▼
	Variables	Datasets
	5	2
2	Select Raster Data	

When you have selected both area-level variables and datasets, the NEXT button will become active and turn green.



The Navigation Bar indicates that the next step will be to select raster data

- Click **NEXT** to move to the Raster Data selection screen.



You will need variables from the Agriculture and Land Cover topics.

Select Raster Data

Select Data & Countries [What is this?](#)

Select Variables

By Topic By Dataset Search

Agriculture Climate Land Cover

Select Countries [Add or Remove Countries \(show\)](#)

Select Countries

Switzerland

Zambia

Select Raster Data

Select Data & Countries [What is this?](#)

Select Variables

By Topic By Dataset Search

Agriculture Climate Land Cover

▶ Cereals (yield, area)

▶ Crop and Pasture lands

▶ Fibers (yield, area)

▶ Forage (yield, area)

▶ Fruit and nut trees

- Click on the *Crop and Pasture lands* variable category.

The Crop and Pasture lands variables will be listed.

- Select two variables, *CROPLAND2000* and *PASTURE2000*, to add them to your cart.

The screenshot shows the 'Agriculture' topic page. Under 'Datasets in this topic', the following table is visible:

Variable	Description	Dataset
<input checked="" type="checkbox"/> CROPLAND2000	Area used as cropland	GLIAGLAND
<input checked="" type="checkbox"/> PASTURE2000	Area used as pasture	GLIAGLAND

Note: Clicking on variable labels will provide additional metadata

- Click on the *Land Cover* topic and then click on the *Global Land Cover 2000* variable category.

The screenshot shows the 'Select Variables' page. The 'Land Cover' topic is selected, and the 'Global Land Cover 2000' category is highlighted.

- After clicking *Global Land Cover 2000* select three variables, *LCBRDEVGRN*, *LCDECIDCL*, *LCDECIDOP*, to add them to your cart.

The screenshot shows a list of variables for selection. The following table is visible:

<input type="checkbox"/> LCARTIF	Artificial Surfaces and Associated Areas	GLC2000
<input type="checkbox"/> LCBARE	Bare Areas	GLC2000
<input checked="" type="checkbox"/> LCBRDEVGRN	Tree Cover, Broadleaved, Evergreen	GLC2000
<input checked="" type="checkbox"/> LCDECIDCL	Tree Cover, Broadleaved, Deciduous, Closed	GLC2000
<input checked="" type="checkbox"/> LCDECIDOP	Tree Cover, Broadleaved, Deciduous, Open	GLC2000
<input type="checkbox"/> LCGRSSHBRB	Grassland/Shrubland	GLC2000
<input type="checkbox"/> LCHERBAC	Herbaceous Cover (contains both pastures and natural)	GLC2000

- Click *NEXT* to go to the Submit step.

Step 10

Check data
cart and
submit
extract

Review your cart in the right panel

Raster Extract		Cancel
1	Rasterize Area-level Data	▼
	Variables	Datasets
	5	2
2	Select Raster Data	▼
	Variables	Countries
	5	2

- Give your extract a short, descriptive *Extract Title*, maybe, “Zambia and Switzerland, education, land cover and use, population.” The Extract Title will appear in your Extract History.

Submit Extract

Extract Details

Extract Title

TerraPop Extract_Zambia and Switzerland, education, land cover and use, population

Extract Notes *(Optional)*


SUBMIT EXTRACT

- Click *Submit Extract*

Step 11

Download
your extract

You will receive an email when the extract is ready

IPUMS Terra data extract #9 is ready.  Inbox x



ipums@umn.edu
to me ▾

Your IPUMS Terra extract 'Zambia and Switzerland, education, land cover and use, population' is ready.

To retrieve your data, codebook, and command files, for Extract #9, go to the link below.

https://demo.terrapop.org/user/extract_requests

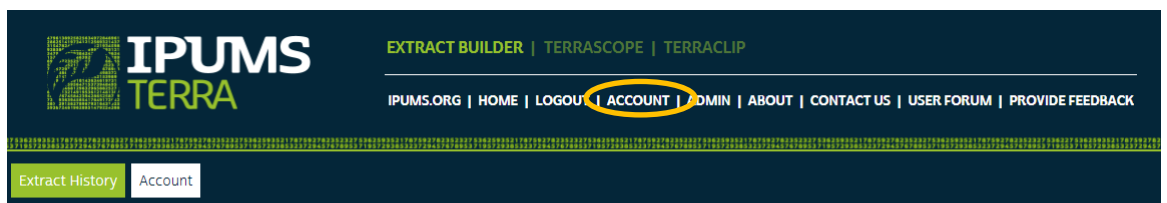
Thank you for your support.

Sincerely,
The IPUMS Terra Team

- To download the data, follow the link in the e-mail, which will take you to your account's "Extract History" page as shown below. This page can also be accessed by clicking **ACCOUNT** in the IPUMS Terra page header

The data will be delivered in a compressed format, make sure you have software available to extract the files.

Raster extracts are provided in geoTIFF format, suitable for analysis in GIS or other software for handling spatial data.



Extract History

Extract Request Number	Date Submitted	Title (click to edit)	Status	Resubmit	Download
5	26 Jan 17:07	TerraPop Extract_Zambia and Switzerland, education, land cover and use, popu	completed	resubmit	download (0.58 MB)