# PLUC data

To run the land use model PLUC, data on the land cover, a digital elevation model (DEM), suitability factors and drivers (demand) is required. PLUC input data has been prepared for the countries Ethiopia, Colombia, Poland, Thailand and Spain. All of the data collected is from recent global datasets. For each country the data are reprojected to a Lambert azimuthal equal area projection, with the center point of the projection in the middle of the country. The borders from the countries are from vector data provided by the Global Administrative Areas (GADM) 2015 dataset. These offer different levels of administrative areas, of which we use the country level. For the PLUC runs, the maps are resampled to a 1km resolution, which is detailed but not too computationally expensive. The data that has been prepared for you to run PLUC is the following:

**Land cover map:** Initial land cover map of 2015. The land cover map used is the ESA land cover CCI (ESA Climate Change Initiative), which is a recent dataset with 300m resolution global annual land cover maps from 1992 to 2015. It consists of 22 land cover classes.

**Cities map:** One of the classes defined in the land cover map is the urban area class. This class defines the PLUC input city map.

**Clone map:** This is an empty map that is used in PCRaster to give the full extent of the map.

**Country.prj:** This is an ESRI projection file, which is the industry standard for providing information about the coordinate system of the data. PCRaster maps do not contain information about the coordinate system.

**Dem map:** This is the digital elevation model. We have used ETOPO1, a 1 arc-minute resolution global relief model, giving the DEM in meters (Amante and Eakins, 2009).

**Null mask map:** For some raster computations (e.g. in PLUC) it is convenient to have a mask map containing all zeros, within the extent of the data.

**Pasture map:** Pasture is not specified in the land cover CCI, so therefore we required additional data. The pasture maps that define the fraction of pasture in 5 arc-minute cells are from the Ramankutty et al. (2008). During the resampling to 1 km resolution these maps are interpolated bilinear.

**Population density map:** Population densities are retrieved from the Global Human Settlement Layer (JRC, 2015), a global 250m resolution map by a European Commission collaboration that gives the number of people per cell.

**Protected areas map:** Protected areas in a 5 arc-minute resolution and are from Global Agro-ecological Zones v3.0, or GAEZ v3.0 (FAO/IIASA, 2012), which is a large collection of global agricultural and ecological maps by the Food and Agriculture Organization of the United Nations.

**Suitability cereals map / suitability alfalfa map:** The crop suitability maps are from GAEZ v3.0 (FAO/IIASA, 2012), like the protected areas map. The original map was in in a 5 arc-minute resolution, so it is resampled and interpolated bilinear. The numbers represent a suitability index on a scale of 0-10000 indicating unsuitable to maximum suitability. These maps assume rain-fed conditions.

**Roads map:** The road map was derived from the Global Roads Inventory Project (GRIP) dataset (Meijer et al., 2018). This dataset contains a vector map of global roads. These roads are rasterized to the 1km resolution and consist of 5 different road classes.

References:

* Amante, C. and B. W. Eakins (2009). ETOPO1 1 Arc-Minute Global Relief Model: Procedures, Data Sources and Analysis. NOAA Technical Memorandum NESDIS NGDC-24. National Geophysical Data Center, NOAA. doi:10.7289/V5C8276M
* ESA: Land Cover CCI Product User Guide Version 2.0, available at: http://maps.elie.ucl.ac.be/CCI/viewer
* FAO/IIASA (2012). Global Agro-ecological Zones (GAEZ v3.0). FAO Rome, Italy and IIASA, Laxenburg, Austria
* Global ADMinistrative Areas (GADM) (2015). Global Administrative Areas http://gadm.org/
* Joint Research Centre (JRC); Columbia University, Center for International Earth Science Information Network - CIESIN (2015). GHS population grid, derived from GPW4, multitemporal (1975, 1990, 2000, 2015). European Commission, Joint Research Centre (JRC) [Dataset] PID:http://data.europa.eu/89h/jrc-ghsl-ghs\_pop\_gpw4\_globe\_r2015a
* Meijer, J.R., Huijbregts, M.A.J., Schotten, K.C.G.J., Schipper, A.M. (2018). Global patterns of current and future road infrastructure. Environ. Res. Lett. 13 064006
* Ramankutty, N., A.T. Evan, C. Monfreda, and J.A. Foley (2008). Farming the planet: 1. Geographic distribution of global agricultural lands in the year 2000. Global Biogeochemical Cycles 22, GB1003, doi:10.1029/2007GB002952.