Terrain Ruggedness and Land Cover: Improved Data for All Research Designs

Supplemental Appendix

October 26, 2015

Appendix 1: A Guide to Data Extraction and Usage

A guide to using the grid-level data

The terrain ruggedness and land cover data are stored in raster data structure. Although national and sub-national terrain ruggedness and land cover datasets described in the article are available for direct download from the authors' websites, ArcGIS Python scripts can be used to aggregate ruggedness and land cover data to other boundaries of interest. The following scripts require that users have installed ArcGIS software on their computers. They are described and provided in turn.

Aggregating Ruggedness Data

#This script calculates a series of ruggedness values from grid-level ruggedness data based on specified administrative-, country-, or other boundaries.

#Replace *AdminData* with the name of the boundaries data of interest and change "NAME" to any unique identifier.

#ruggednessTable.dbf is the name of table that will generate ruggedness. Leave "DATA" and "ALL".

#When you run this script, it will generate minimum, maximum, range, mean, standard deviation, and sum measures for each unit.

#Set evironment (*env.workspace*) where your data is located.

import arcpy
from arcpy import env
from arcpy.sa import ∗
env.workspace = "*C* : */datalocation*"
arcpy.gp.ZonalStatisticsAsTable_sa("*AdminData*", "*NAME*", "*ruggedness.tif*", "*ruggednessTable.dbf*", "*DATA*", "*ALL*")

Processing and Aggregating Land Cover Data

#The following script converts a shapefile boundary file to a raster file.

#Set evironment (*env.workspace*) to the location of your data.

#Replace *in_features* "admin" to adminstrative boundary and replace *field* = "*NAME*" to unique identifier of your administrative boundary.

cell_size should be same size as the landcover data.

import arcpy
from arcpy import env
env.workspace = "*c* : */datalocation*"

$arcpy.FeatureToRaster_conversion(in_features = "admin",\ field = "NAME",\ out_raster = "admin.tif",\ cell_size = "0.0027777778")$

#The following script combines two raster files.

#Set evironment (*env.workspace*) to the location of your data.

#Replace *admin.tif* with the adminstrative boundaries that were converted to raster, and replace LandCover.tif with LandCover.

import arcpy
from arcpy import env
*from arcpy.sa import **
env.workspace = "C : /datalocation"
outCombine = Combine(["admin.tif", "LandCover.tif"])

Appendix 2: United Nations Land Cover Classification System

Land cover types are numerically denoted and described under the United Nations Land Cover Classification System as follows:

i 11: Post-flooding or irrigated croplands (or aquatic) (irrigated tree crops, irrigated shrub crops, irrigated herbaceous crops, post-flooding cultivation of herbaceous crops)

ii 14: Rainfed croplands (rainfed shrub, tree, and/or herbaceous crops)

iii 20: Mosaic cropland (50-70%) / vegetation (20-50%) (cultivated and managed terrestrial areas; natural and semi-natural primarily terrestrial vegetation)

iv 30: Mosaic vegetation (50-70%) / cropland (20-50%) (natural and semi-natural primarily terrestrial vegetation / Cultivated and managed terrestrial areas)

v 40: Closed to open (> 15%) broadleaved evergreen or semi-deciduous forest (¿ 5m) (broadleaved evergreen closed to open trees; semi-deciduous closed to open trees)

vi 50: Closed (> 40%) broadleaved deciduous forest (> 5m) (broadleaved deciduous closed to open (100-40

vii 60: Open (15-40%) broadleaved deciduous forest/woodland (> 5m) (broadleaved deciduous (40-(20-10)%) woodland)

viii 70: Closed (> 40%) needleleaved evergreen forest (> 5m) (needleleaved evergreen closed to open (100-40%) trees)

ix 90: Open (15-40%) needleleaved deciduous or evergreen forest (¿5m) (needleleaved evergreen (40-(20-10)%) woodland; needleleaved deciduous (40-(20-10)%) woodland)

x 100: Closed to open (> 15%) mixed broadleaved and needleleaved forest (¿5m) (broadleaved closed to open trees; needleleaved closed to open trees)

xi 110: Mosaic forest or shrubland (50-70%) / grassland (20-50%) (closed to open trees; closed to open shrubland (thicket); herbaceous closed to open vegetation)

xii 120: Mosaic grassland (50-70%) / forest or shrubland (20-50%) (closed to open shrubland (thicket); Herbaceous closed to open vegetation: closed to open trees)

xiii 130: Closed to open (> 15%) (broadleaved or needleleaved, evergreen or deciduous) shrubland (< 5m) (broadleaved closed to open shrubland (thicket))

xiv 140: Closed to open (> 15%) herbaceous vegetation (grassland, savannas or lichens/mosses) (herbaceous closed to very open vegetation; closed to open lichens/mosses)

xv 150: Sparse (< 15%) vegetation (sparse trees; herbaceous sparse vegetation; sparse shrubs)

xvi 160: Closed to open (> 15%) broadleaved forest regularly flooded (semi-permanently or temporarily) - Fresh or brackish water (closed to open (100-40%) broadleaved trees on temporarily flooded land, water quality: fresh water; closed to open (100-40%) broadleaved trees on permanently flooded land, water quality: fresh water)

xvii 170: Closed (> 40%) broadleaved forest or shrubland permanently flooded - Saline or brackish water (closed to open (100-40%) broadleaved trees on permanently flooded land (with daily variations), water quality: saline water; closed to open (100-40%) broadleaved trees on permanently flooded land (with daily variations), water quality: brackish water; closed to open (100-40%) semi-deciduous shrubland on permanently flooded land (with daily variations), water quality: saline water; closed to open (100-40%) semi-deciduous shrubland on permanently flooded land (with daily variations), water quality: brackish water)

xviii 180: Closed to open (> 15%) grassland or woody vegetation on regularly flooded or waterlogged soil - Fresh, brackish or saline water (closed to open shrubs; closed to open herbaceous vegetation)

xix 190: Artificial surfaces and associated areas (Urban areas > 50%)

xx 200: Bare areas

xxi 210: Water bodies (natural water bodies; artificial water bodies)