HOW TO GENERATE THE INPUT FILES FOR THE ECOSYSTEM SERVICES DASHBOARD

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This document is a guide on how to create the ABSAT-Ecosystem-Services-Dashboard input files. For each polygon within a group of polygons selected by the user (e.g., administrative units, natural protected areas, indigenous territories, etc.), these files contain the percentage of degraded and deforested area in 2020, 2020 evapotranspiration (ET) and land surface temperature (LST) values, and changes in ET and LST based on projected scenarios of deforestation and forest degradation (refer to the list of input files located at the end of this document).

Requirements: ArcGIS license, R (https://www.r-project.org/) and R studio (https://www.rstudio.com/products/rstudio/download/)

Scritps are here: https://github.com/yreygadas/HowToCreateFiles4EcoServicesDash.git
Rasters are here: https://drive.google.com/drive/folders/1al6EwbT7nqHtmZYo27l5rhPF-5y6zFfN?usp=sharing

A. Count the number of non-forest, intact forest, degraded, and deforested cells in each polygon

1. Download the four MTDD rasters located in the "MTDDrasters" folder and place all of them in a new folder within your computer (do not rename them).
2. Open the script "1_CelCounts_byFC_DegDefScenarios.py" script using a Python Integrated Development Environment-IDLE (e.g., IDLE ArcGIS pro, PyScripter) and enter the user-defined parameters:

```
################### Set before running the script ######################
pathDBF = r'D:/Yunuen/6PostDoc/Dashboards/DBFCellCounts'
pathMTDD = r'D:/Yunuen/6PostDoc/Dashboards/Layers'
polygons= 'D:/Yunuen/6PostDoc/Dashboards/Layers/Tis_TerritoriosIndigenas_sa_greater9sq.shp'
areaPrefix= "IndTerr"
zoneField= "objectid"
########################################################################
```

   i. pathDBF= this is the directory where the output files from this script will be located.
   ii. pathMTDD= this is the directory where the MTDD rasters downloaded in step A1 are stored.
   iii. polygons= this is the shapefile containing the polygons for which the ET and LST values will be calculated based on scenarios of degradation and deforestation.
   iv. areaPrefix= this is an identifier selected by the user to facilitate the identification of the output files (it refers to the type of polygons: municipalities, protected areas, etc.).
   v. zoneField= this is the field that contains the values that define each polygon. It is an integer or a string field within the shapefile entered in "polygons".

3. Run the script.
4. Find the output files within the directory entered in step A2i and delete all files except the ones ending in ".dbf".

B. Calculate evapotranspiration changes based on all possible degradation and deforestation scenarios by polygon

5. Download the four ET rasters located in the "ETrasters" folder and place all of them in a new folder within your computer (do not rename them; it can be the same folder as in step A1).
1. Open the script "2_ET_byFC_DegDefScenarios.py" script using a Python IDLE and enter the user-defined parameters:

```
################### Set before running the script ######################
pathDBF = r'D:/Yunuen/6PostDoc/Dashboards/ET/DBFiles'
pathET=r'D:/Yunuen/6PostDoc/Dashboards/Layers'
polygons= 'D:/Yunuen/6PostDoc/Dashboards/Layers/Tis_TerritoriosIndigenas_sa_greater9sq.shp'
areaPrefix= "IndTerr"
zoneField= "objectid"
########################################################################
```

i. pathDBF= this is the directory where the output files from this script will be located (it has to be a directory different from the one entered in step A2i).
ii. pathET= this is the directory where the ET rasters downloaded in step B1 are stored.
iii. polygons=this is the shapefile containing the polygons for which the scenarios will be calculated.
iv. areaPrefix= this is an identifier selected by the user to facilitate the identification of the output files (same as in step A2iv).
v. zoneField= this is the field that contains the values that define each polygon. It is an integer or a string field within the shapefile entered in "polygons".

2. Run the script.
3. Find the output files within the directory entered in step B2i and delete all files except the ones ending in ".dbf".
4. Open the script "3_ET_scenariosDeg&Def.R" using R studio and enter the user-defined parameters:

```
############################ User-defined parameters ###################################################
# Set study area prefix
prefix<-"IndTerr"
# Set up the working directory where all the .dbf files with the variable values are located
dir.var <- "D:/Yunuen/6PostDoc/Dashboards/ET/DBFiles"
# Set up the working directory where all the .dbf files with the cell counts are located
dir.cellcounts<- "D:/Yunuen/6PostDoc/Dashboards/DBFCellCounts"
#Set the name of the output directory where the results will be stored
dir.out <- "D:/Yunuen/6PostDoc/Dashboards/Output"
#Number of polygons in the shapefile
polNum<- 554
########################################################################################################
```

i. prefix= this is the same identifier entered in steps A2iv and B2iv.
ii. dir.var= this is the directory entered in step B2i.
iii. dir.cellcounts= this is the directory entered in step A2i.

iv. dir.out=this is the directory where the results will be stored (it can be a non-existant folder, the script will create it).
v. polNum= this is the number of polygons contained in the shapefile entered in steps A2iii and B2iii.

5. Select all code lines and run the script.
6. Find the .csv output files within the directory entered in step B5iv.

C. Calculate land surface temperature changes based on all possible degradation and deforestation scenarios by polygon

1. Download the four LST rasters located in the "LSTrasters" folder and place all of them in a new folder within your computer (do not rename them; it can be the same folder as in steps A1 and B1).
2. Open the script "2_LST_byFC_DegDefScenarios.py" script using a Python IDLE and enter the user-defined parameters:

```
################### Set before running the script ######################
pathDBF = r'D:/Yunuen/6PostDoc/Dashboards/LST/DBFiles'
pathLST= r'D:/Yunuen/6PostDoc/Dashboards/Layers'
polygons= 'D:/Yunuen/6PostDoc/Dashboards/Layers/Tis_TerritoriosIndigenas_sa_greater9sq.shp'
areaPrefix= "IndTerr"
zoneField= "objectid"
########################################################################
```

i. pathDBF= this is the directory location where the output files from this script will be located (it has to be a directory different from the one entered in steps A2i and B2i).
ii. pathET= this is the directory where the LST rasters downloaded in step C1 are stored.
iii. polygons=this is the shapefile containing the polygons for which the scenarios will be calculated.
iv. areaPrefix= this is an identifier selected by the user to facilitate the identification of the output files (same as in steps A2iv and B2iv).
v. zoneField= this is the field that contains the values that define each polygon. It is an integer or a string field within the shapefile entered in "polygons".

3. Run the script.
4. Find the output files within the directory entered in step C2i and delete all files except the ones ending in ".dbf".

5. Open the script “3_LST_scenariosDeg&Def.R” using R studio and enter the user-defined parameters:

```
#################################################################################################
# Set study area prefix
prefix<-"IndTerr"
# Set up the working directory where all the .dbf files with the variable values are located
dir.var <- "D:/Yunuen/6PostDoc/Dashboards/LST/DBFiles"
# Set up the working directory where all the .dbf files with the cell counts are located
dir.cellcounts<- "D:/Yunuen/6PostDoc/Dashboards/DBFCellCounts"
#Set the name of the output directory where the results will be stored
dir.out <- "D:/Yunuen/6PostDoc/Dashboards/Output"
#Number of polygons in the shapefile
polNum<- 554
#################################################################################################
```

   i. prefix= this is the same identifier entered in steps A2iv, B2iv, and C2iv.
   ii. dir.var= this is the directory entered in step C2i.
   iii. dir.cellcounts= this is the directory entered in step A2i.
   iv. dir.out=this is the directory where the results will be stored (this has to be the same folder as in step B5iv).
   v. polNum= this is the number of polygons contained in the shapefile entered in steps A2iii, B2iii, and C2iii.

6. Select all code lines and run the script.
7. Find the .csv output files within the directory entered in steps B5iv and C5iv.

Final ABSAT-Ecosystem-Services-Dashboard input files (the first three are located in the directory entered in steps B5iv and C5iv):

1. Prefix_ET_ScenariosDegDef.csv. ET values based on projected scenarios of deforestation and forest degradation per polygon
2. Prefix_LST_ScenariosDegDef.csv. LST values based on projected scenarios of deforestation and forest degradation per polygon.
3. Prefix_FCareas_ET&LSTvalues.csv. Percentage of degraded and deforested area in 2020, as well as 2020 ET and LST values per polygon.
4. Polygons shapefile provided by de user.