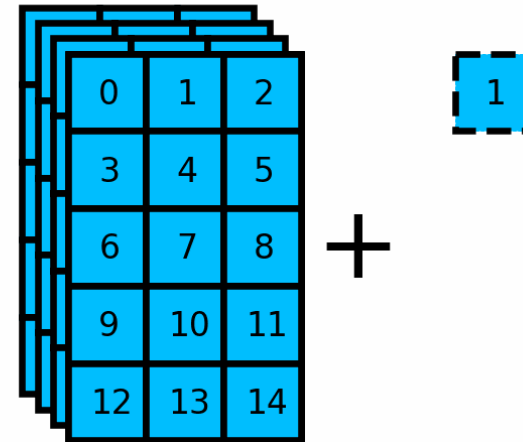


# Data Preparation for PyAEZ

Pre-processing of the input data (weather, elevation, soils) for PyAEZ

# Content

1. Converting Raster to NumPy file
2. Cell alignment for Raster and Vector
3. Harmonized Soil Data Base (HSDB) preparation



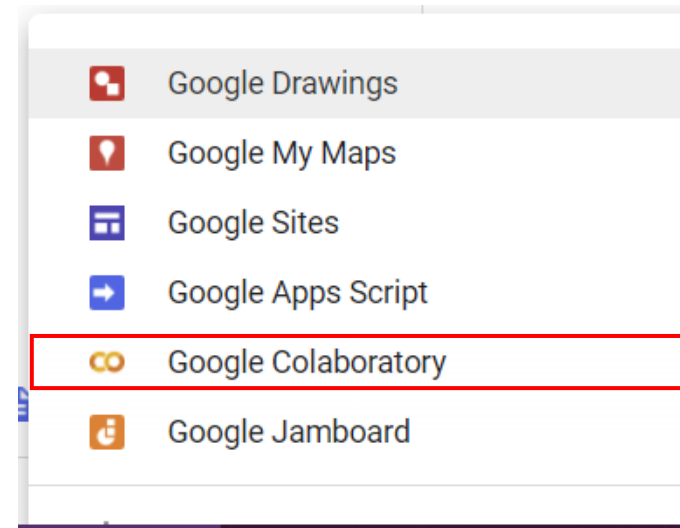
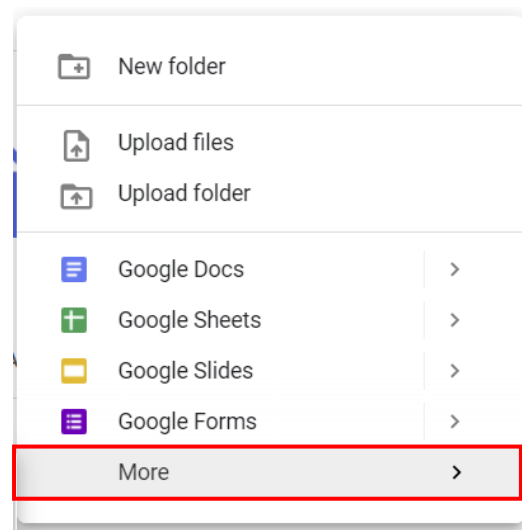
© Matt Eding

# 1. Converting Raster to NumPy file

# 1. Converting Raster to NumPy file

## ➤ Getting start with google Colab:

- Open Google drive, upload the file shared from Zoom to your Drive
- Go to your working directory and create new Google Colab notebook by right click and add new Google Collaboratory



# 1. Converting Raster to NumPy file

```
'''connecting to google drive'''
```

```
from google.colab import drive  
drive.mount('/content/drive')
```

```
'''setting working directory'''
```

```
import os  
os.chdir("drive/My Drive/your/directory")
```

```
'''import supporting libraries'''
```

```
import numpy as np  
import matplotlib.pyplot as plt  
import gdal
```

# 1. Converting Raster to NumPy

```
## Loading the Raster file and save it as Numpy format
```

```
im_width = 35  
im_height = 40
```

```
## Create numpy array for storing data
```

```
min_temp = np.zeros((im_height, im_width, 12))
```

```
## Writing the loop to read monthly data and store in NumPy array
```

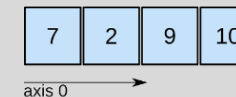
```
for i1 in range (1,13):
```

```
    min_temp[:, :, i1-1] = gdal.open('./climate/TempMin_'+str(i1)+'.tif').ReadAsArray()
```

```
## Save the NumPy array
```

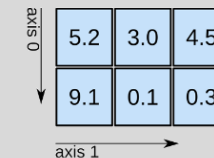
```
np.save('./input/numpy_file/min_temp.npy', min_temp)
```

1D array



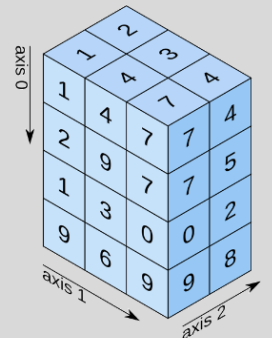
shape: (4,)

2D array



shape: (2, 3)

3D array



shape: (4, 3, 2)

# 1. Converting Raster to NumPy file

## ## Practices Session

Load raster for other parameter and save as NumPy file(.npy)

- precipitation
- short\_rad
- wind\_speed

## 2. Cell alignment for Raster and Vector



## 2. Cell alignment for Raster and Vector

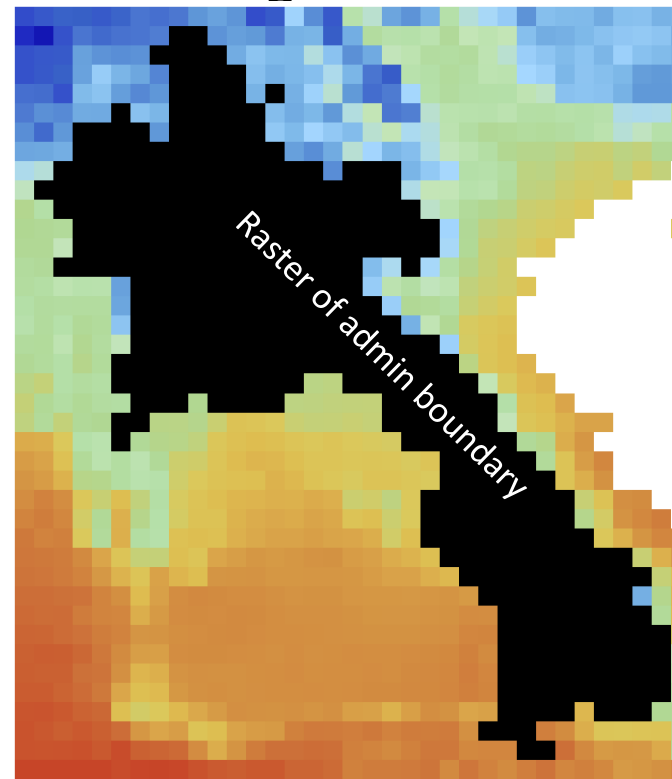
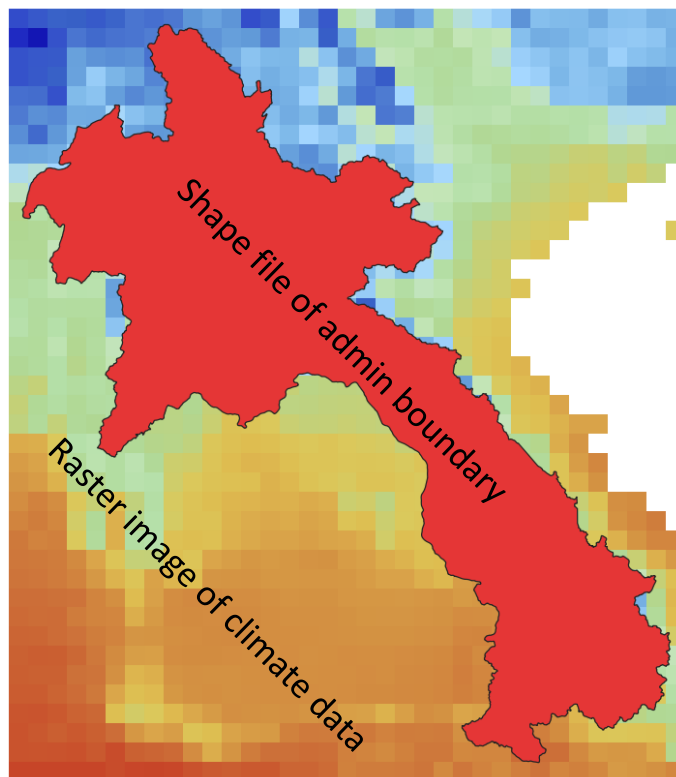
Raster files need to be prepared with same **width** and **height** before input in the PyAEZ for simulation:

- Climate data: rainfall, temperature, solar radiation, wind speed, humidity
- Admin mask boundary
- Digital elevation model
- Soil and Slope map

# Cell alignment for Raster and Vector

## Admin mask boundary input:

- Shape file for the boundary, add new attribute for masking (admin\_mask =1)
- Raster file with corrected width and height



gadm36\_LAO\_0 — Features Total: 1, Filtered: 1, Selected: 0

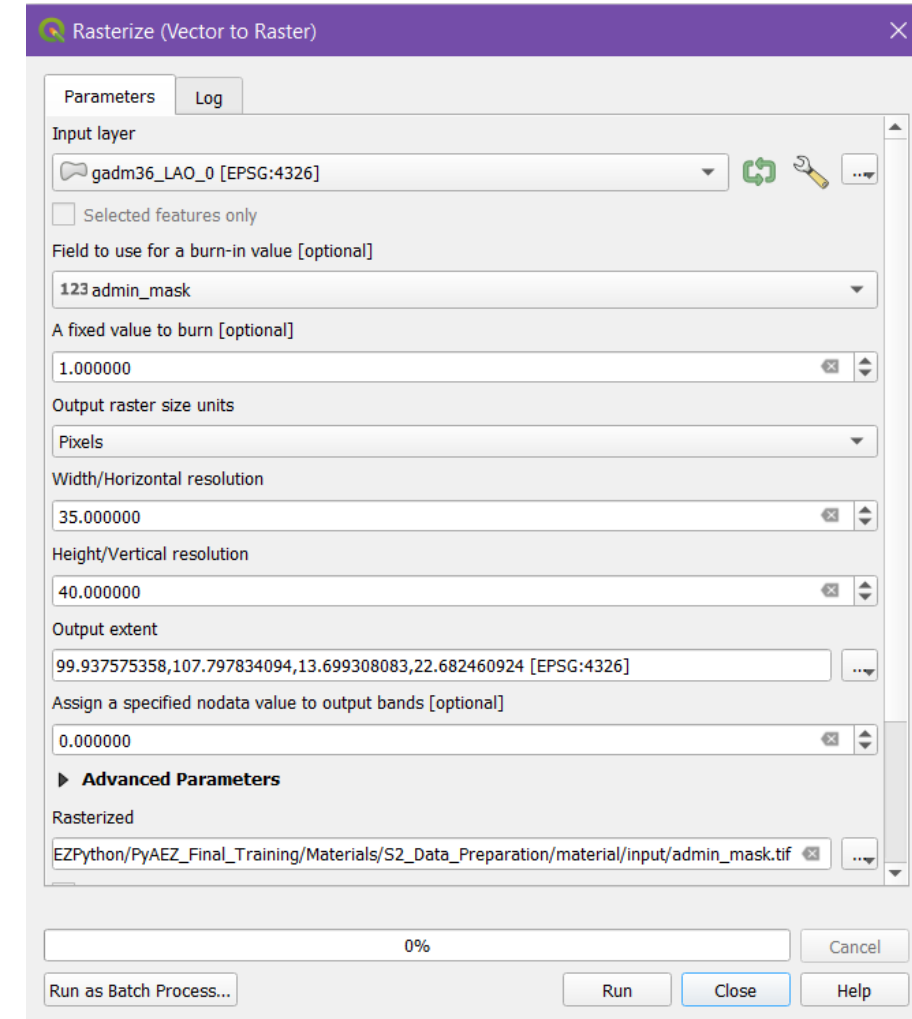
	GID_0	NAME_0	admin_mask
1	LAO	Laos	1

CRS	EPSG:4326 - WGS 84 - Geographic
Extent	99.9375753582967548,13.6993080828227036 : 107.7978340943425621,22.6824609240179171
Unit	degrees
Width	35
Height	40
Data type	Float64 - Sixty four bit floating point
GDAL Driver	GTiff
Description	
GDAL Driver	GeoTIFF
Metadata	

# Cell alignment for Raster and Vector

## ➤ Rasterize (vector to Raster):

- Input layer: boundary shape file
- Field for burn in value: 1
- Output raster size: Pixels
- Width: 35
- Height: 40
- Output extent: calculate from layer (corrected raster)
- Rasterized: directory and name of the raster file

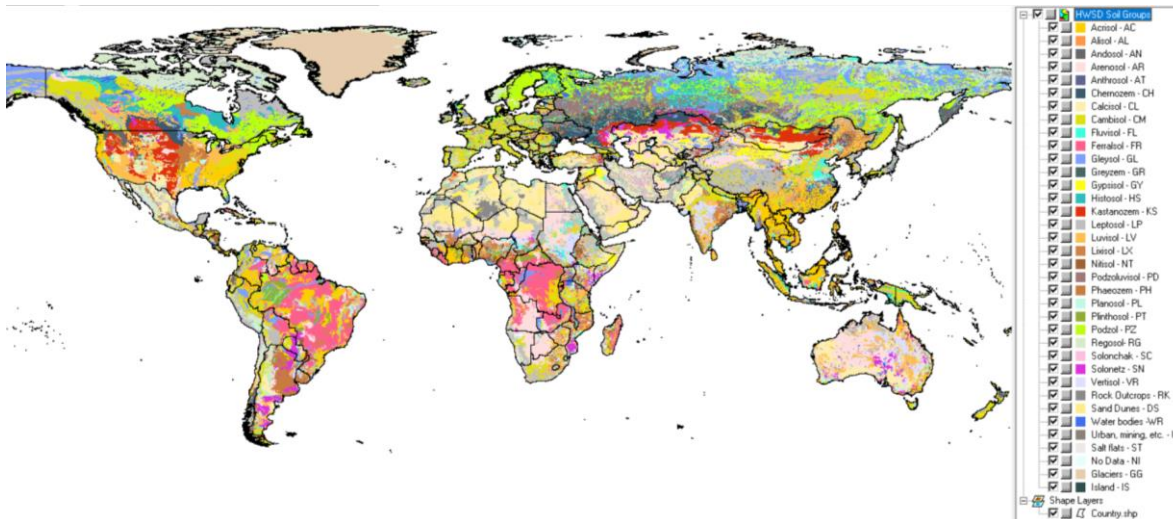


## 2. Harmonized Soil Data Base (HWSB) preparation

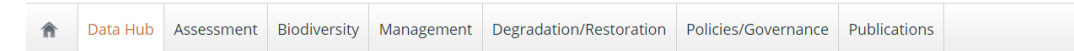
# Harmonized Soil Data Base (HWSB)

## Harmonized World Soil Database v 1.2:

- 30 arc-second raster database
- Over 15 000 different soil mapping units
- Link for download: [HWSD Raster](#)



## FAO SOILS PORTAL



### Soil properties

### Soil classification

### Sampling and laboratory techniques

### Soil Maps and Databases

Global Soil Organic Carbon Map (GSOCmap)

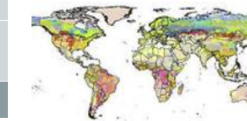
FAO/UNESCO Soil Map of the World

**Harmonized world soil database v1.2**

Other Global Soil Maps and Databases

Regional and National

## Harmonized World Soil Database v 1.2



This is the result of a collaboration between the FAO with IIASA, ISRIC-World Soil Information, Institute of Soil Science, Chinese Academy of Sciences (ISSCAS), and the Joint Research Centre of the European Commission (JRC)

The **Harmonized World Soil Database** is a **30 arc-second raster database** with over 15 000 different soil mapping units that combines existing regional and national updates of soil information worldwide (SOTER, ESD, Soil Map of China, WISE) with the information contained within the 1:5 000 000 scale FAO-UNESCO Soil Map of the World (FAO, 1971-1981).

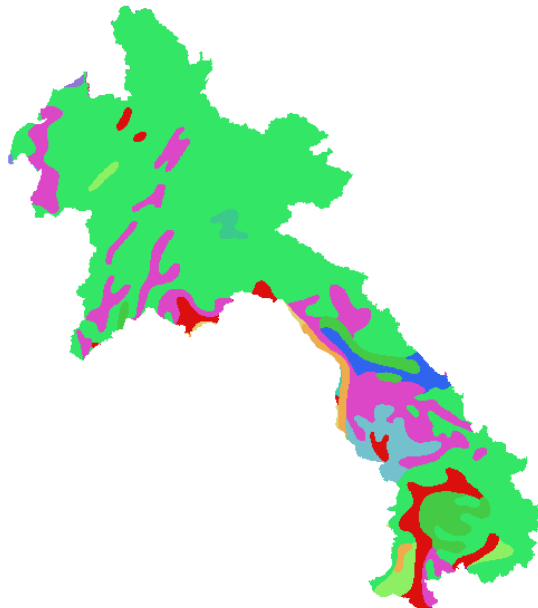
The resulting raster database consists of 21600 rows and 43200 columns, which are linked to harmonized soil property data. The use of a standardized structure allows for the **linkage of the attribute data with the raster map** to display or query the composition in terms of soil units and the **characterization of selected soil parameters** (organic Carbon, pH, water storage capacity, soil depth, cation exchange capacity of the soil and the clay fraction, total exchangeable nutrients, lime and gypsum contents, sodium exchange percentage, salinity, textural class and granulometry).

**Download :** [Download viewer & data \(only soil types\)](#) | [Download database \(.mdb\)](#) | [HWSD Raster](#) | [Technical Report and Instructions](#)

# Harmonized Soil Data Base (HWSB)

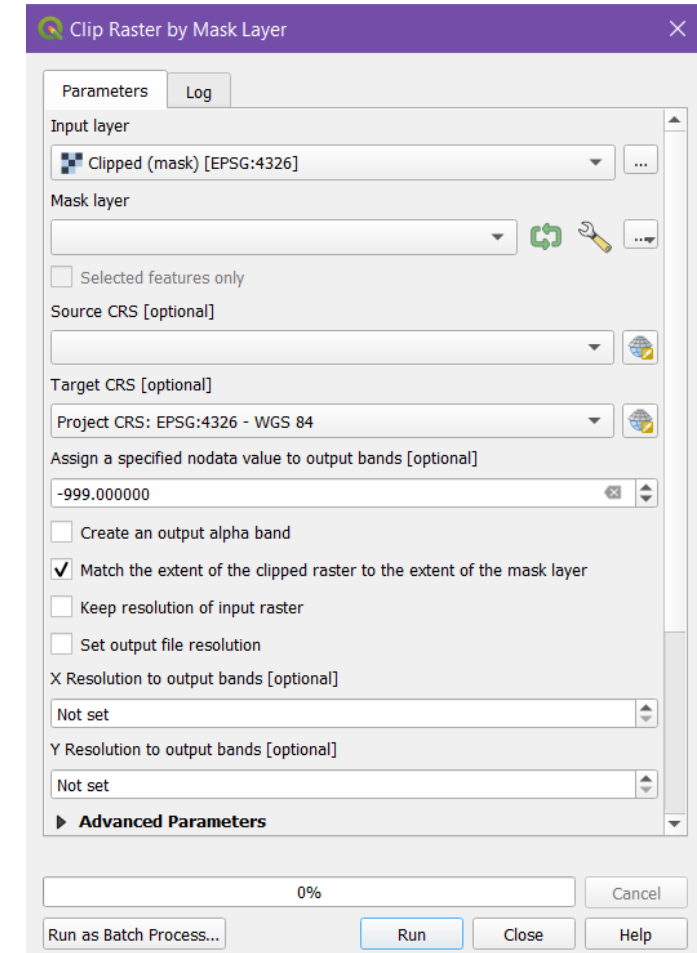
## ➤ Clip Raster by Mask Layer

- Input layer: world soil data
- Target CRS: EPSG: 4326 – WGS 84
- Assign no data value: -999
- Save to temporary file



### Information from provider

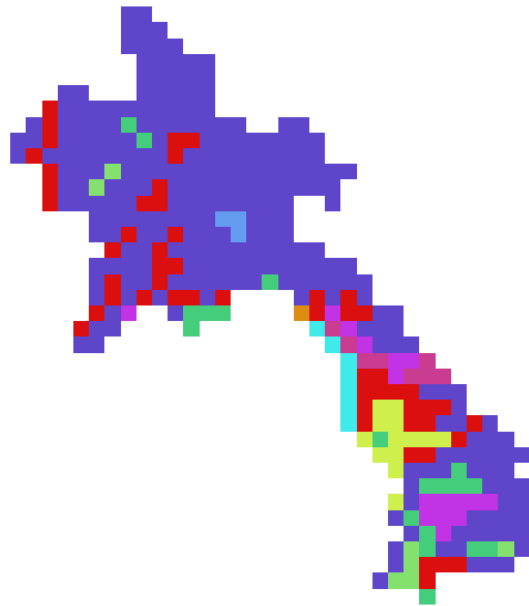
Name	Clipped (mask)
Path	<a href="C:\Users\Thaileng_GIC\AppData\Local\Temp\processing_GbghYM\4187bfd3df1e4440b50230d5770b6a6e\OUTPUT.tif">C:\Users\Thaileng_GIC\AppData\Local\Temp\processing_GbghYM\4187bfd3df1e4440b50230d5770b6a6e\OUTPUT.tif</a>
CRS	EPSG:4326 - WGS 84 - Geographic
Extent	100.0833333332933108,13.8999999999944421 ; 107.6416666666236210,22.5083333333243338
Unit	degrees
Width	907
Height	1033
Data type	UInt16 - Sixteen bit unsigned integer
GDAL Driver	GTiff
Description	
GDAL Driver	GeoTIFF
Metadata	
Dataset	C:/Users/Thaileng_GIC/AppData/Local/Temp/processing_GbghYM/4187bfd3df1e4440b50230d5770b6a6e/OUTPUT.tif
Description	



# Harmonized Soil Data Base (HWSB)

## ➤ Export Raster (resampling):

- Filename
- Extent: Calculate from layer
- Resolution: width and height



### Information from provider

<b>Name</b>	lao_soil
<b>Path</b>	E:\My Drive\GoogleDrive\AEZPython\PyAEZ_Final Training\Materials\S2 Data Preparation\material\input\lao_soil.tif
<b>CRS</b>	EPSG:4326 - WGS 84 - Geographic
<b>Extent</b>	99.9375753580000037,13.6993080830000000 : 107.7978340939999953,22.6824609240000008
<b>Unit</b>	degrees
<b>Width</b>	35
<b>Height</b>	40
<b>Data type</b>	UInt16 - Sixteen bit unsigned integer
<b>GDAL</b>	GTiff

End