Quantum GIS Basic Operations (Lisboa 1.8.0)

Raster Operations

The QGIS Manual steps through many more basic operations than the following exercise, and will be occasionally be referenced within these NOTE boxes. See the official full Manual here: http://docs.qgis.org/1.8/html/en/docs/user_manual/index.html. A downloadable .pdf version is available on the Quantum GIS website, too.

Acquiring Data:

Point your web browser to: http://www.worldclim.org/current and download ESRI grids for Bioclim variables at 10 arc-minutes: bio_10m_esri.zip (9.5 mb)

Unzip to your GIS folder; it will unzip into its own folder ‘bio’.

TIP—Several raster formats exist which can be confusing: common ones are Geotiff (*.tif), BIL (*.bil), ascii (*.asc or *.txt), and ESRI ArcInfo Grid. ESRI grids will have folders of the grid names and an INFO folder. Do not separate these and do not rename the folders unless you are using a GIS program as these will render them useless.

I. Installing QGIS Plugins
   • To install plugins that extend raster operations, click the menu Plugins→Fetch Python Plugins. Repositories may take a while to load until this screen:

   ![QGIS Python Plugin Installer](image)

   • Under the tab “Plugins”, type GDAL into the dialog “Filter:”
   • Select “GDALTools” then click “Install Plugin”

II. Adding raster
• Add raster data by clicking on the “Add raster layer” icon at the top of the screen.

• Browse to the folder of GIS data (assuming you downloaded the Bio grids above), and open bio_1 folder, double-click on “w001001.adf”, which is the data file of an ESRI ArcINFO grid. This will be added to your Data View in QGIS.

Unfortunately QGIS doesn’t really take advantage of the ESRI ArcINFO grid format and all sorts of metadata are lost when importing, including the name of the raster! To manually adjust, double-click on the newly added raster (or right-click on layer ➔ Properties)

General Tab:

• Replace Display Name with ESRI ArcINFO grid name. Here, it is “bio_1” (seen in the Layer Source path).
• Adjustments to its appearance are also made here with options in Style, Transparency, Colormap tabs.
III. Clipping Rasters with a Mask

It’s important that all input rasters for modeling have the identical extent, so this method will ensure that all clipped rasters have the same footprint.

1. Create a shapefile mask
   - Click on the menu “Layer” → “New” → “New Shapefile Layer”.
   - Select the radio button at the top to “Polygon”.
   - If there will be more than one polygon, add a New Attribute to name them in the attribute table. If not, then leave blank.
   - Hit OK, and browse/choose a filename to save the new shapefile, such as ‘clipshape.shp’
   - Next, click on the “Toggle Editing” icon at the top of the screen, which appears as a blue pencil.
   - Then click on the “Add Feature” icon. Your cursor will then turn into a targeting reticle. You can then use your cursor to plot the vertices of your shapefile.
   - After you finish drawing the bounds, right-click to complete the process. You will then be prompted to name the element. If you had named it previously, just click “OK”. Then click “Toggle Editing” to finalize your shapefile.

2. Clip Rasters
   - Click on the menu menu “Raster” → “Extraction” → “Clipper”.

   Here, select the input raster by using the dropdown menu of rasters in your Data View or elsewhere using “Select...”.

   The output file should be designated from the “Select...” button, where you can properly organize your raster datasets.

   --Choose Clipping Mode to Mask Layer, and select the shapefile you just created.

   --Choose the file format .ASC for creating datasets for modeling in Maxent and R.

   --Choose .TIF for general GIS and visualization work then check the box “Load into canvas when finished” before hitting OK.
This can be repeated for any other rasters to clip.

For Batch processing, note the box below where GDALWARP commands are generated. This can be copy and pasted into OSGeo4W Shell (for Windows) and run as a command. For more advanced usage, a batch script can be written with a for loop and run at sh. More details on GDALWARP parameters are here: [http://www.gdal.org/gdalwarp.html](http://www.gdal.org/gdalwarp.html)

An example might run like this:

```
for f in *.tif
do
echo "Processing $f"

gdalwarp -dstnodata -32768 -q -cutline "Workshops/QGIS-tut/clipshape.shp" -crop_to_cutline -of AAIGrid /Datasets/grd/alt/alt/w001001.adf "Workshops/QGIS-tut/grd/bio/testalt-2.asc"

done
```

but different versions may require slightly different wildcards etc.

**IV. Raster Calculator**

- You can perform raster calculations by clicking the menu “Raster” → “Raster calculator...” to bring up this window.
Raster bands that are in your Data View will be available in the Raster bands box. Double-clicking on them will pop them to the calculator expression window at the bottom.

Use either the basic arithmetic or logical or trig Operators in the calculator panel.

Learning more about Python and QGIS—A great tutorial has been posted here: [http://www.qgisworkshop.org/html/workshop/python_in_qgis_tutorial2.html](http://www.qgisworkshop.org/html/workshop/python_in_qgis_tutorial2.html) which steps you through python commands run in the Python Console.

Yet another way to batch process rasters is using R Statistics and \{raster\} and \{sp\} packages. We will demonstrate this in class.

```r
#Demo in R (could go something like this):
files <- list.files(pattern = '\bil$')  #Bioclim raster set
s <- stack(files)
shp <- readShapePoly("shapefile to clip")
s.crop <- crop(s, shp)
bionum <- c(1:19)
for (i in 1:length(files)) {
    writeRaster (s.crop, filename = paste("bio", bionum[i], ".asc", sep=""), format="ascii", overwrite=TRUE)
}
```

**By the end of this session:** You should have a set of rasters in ASC format that is clipped to your modeling extent. You may have more than one set: one in ASC for modeling, others in GeoTiff or other for GIS.