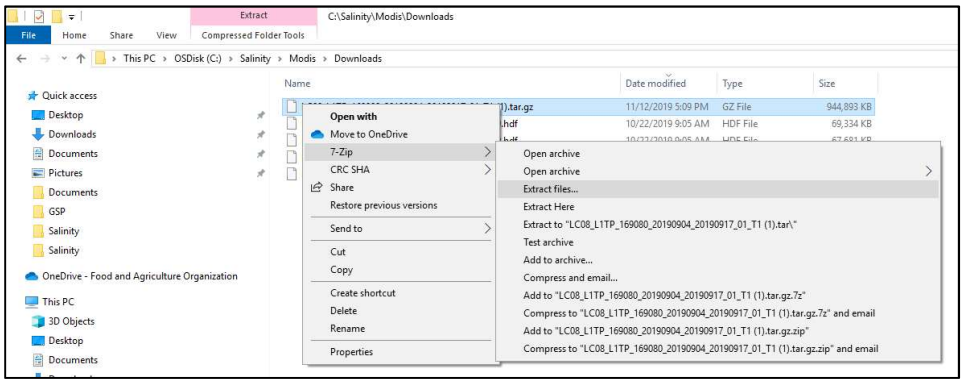
# Mosaicking and clipping remote sensing images

Step 1: Preparing downloaded images

Most downloaded images are wrapped in compressed files such as .zip, .rar or .gz. They need unpacking into commonly used GIS file formats such as geoTIFF, ASCII, HDF, etc. Unpack the downloaded file by *right-click* and choosing unpacking software such as WinZip or WinRar or 7-Zip. Select *Extract all* files and choose the destination folder (such as C:/Salinity/Output)



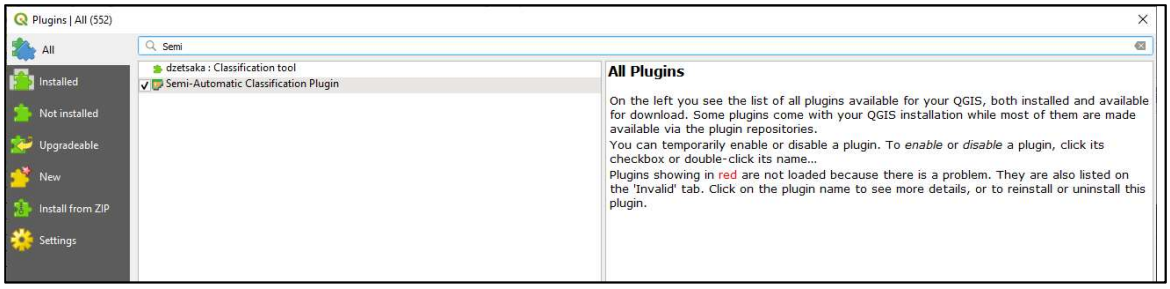

Sometimes the extracted file is still compressed and need a second unpacking to extract the GIS files. The final files are ready for mosaicking or clipping. If there are many zipped files from image download, then each file may be unzipped in its own folder (by creating a new folder, giving it a name and unzipping the set of files in it. For example, if there are four downloaded images covering the country, four folders are created and each file placed in it. Unzipping is then done in each corresponding folder)

Step 2: Correcting remote sensing images

Downloaded remote sensing images need conversion into reflectance and geometrical correction. Semi -Automatic Classification Plugin in QGIS provides a quick way to achieve these two processes in one single pass.

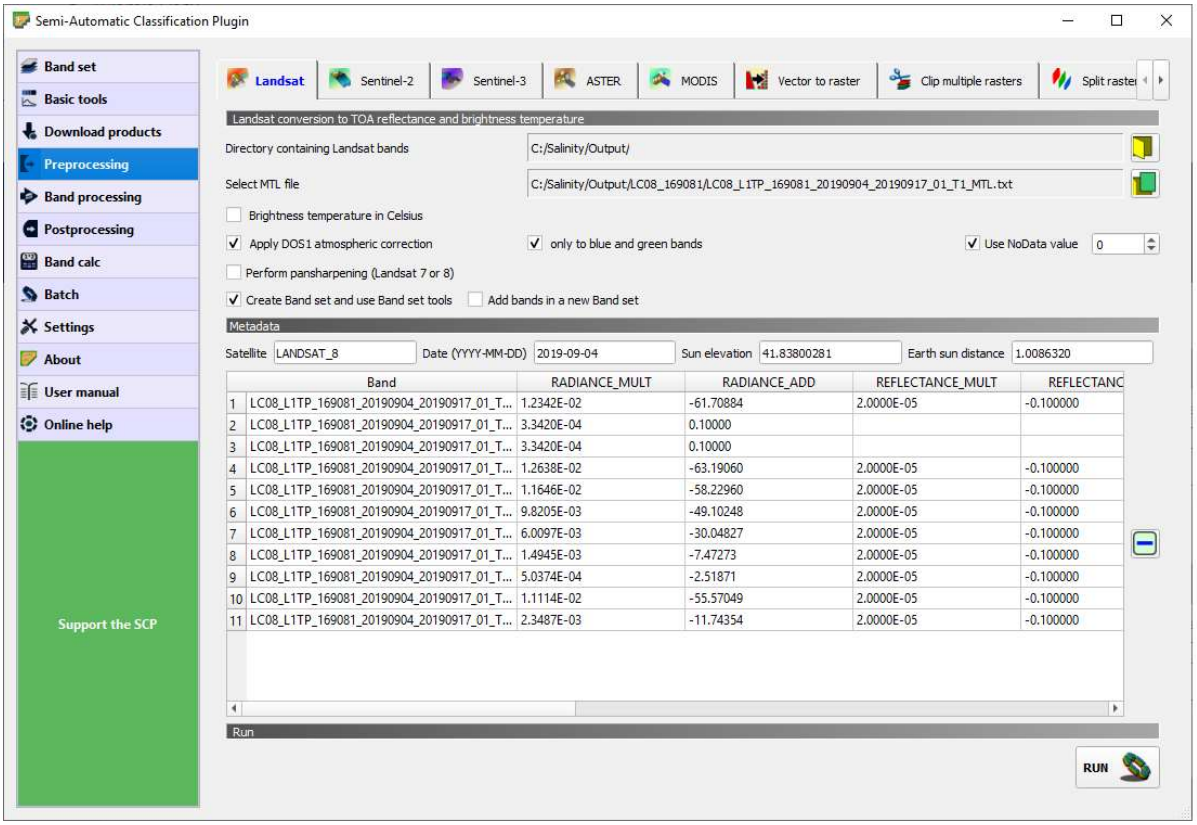
Install Semi-Automatic Classification Plugin: Click *Plugin* the choose *Manage and Install Plugins*


Type *Semi* in the search space and the plugin will show up. Check the box behind it and click *Install* button at the bottom-left corner.




In the main window, click the plugin icon (circled in red in the image below) to launch the plugin

The classification plugin has a number of options grouped into main functions with a list at the far left side of the widow and includes *Band set, Basic Tools* …, up to *Online help*. Each option has sub-functions on the right panel. For image correction, the main function on the left is *Preprocessing*. When selected, the *preprocessing* sub-functions appear on the right panel. At the top of these sub-functions is list of satellite missions such as Landsat, Sentinel-2, Sentinel-3, ASTER, MODIS, etc. The icon containing the image of choice is selected from this list (e.g. Landsat).



The folder containing the unzipped images is specified by clicking the folder icon in front of the space after *Directory containing Landsat bands* (if using Landsat). For Sentinel-2 and Landsat OLI, a second option is given for selecting the metafile for image correction. In Landsat it is the *MTL File* and *MTD_MSI* for Sentinel-2. When prompted, navigate to the same folder as unzipped image source and select the file with corresponding name (MTL.txt or MTD_MSI.txt).

Once the files have been loaded, the image bands will be listed in the space below the *Metadata* section. The processing starts by clicking the *Run* button. However, *select-folder* window may pop-up to show the path for saving the output processed images. The final processed images are also loaded into the QGIS view window.

Step 2: Mosaicking images

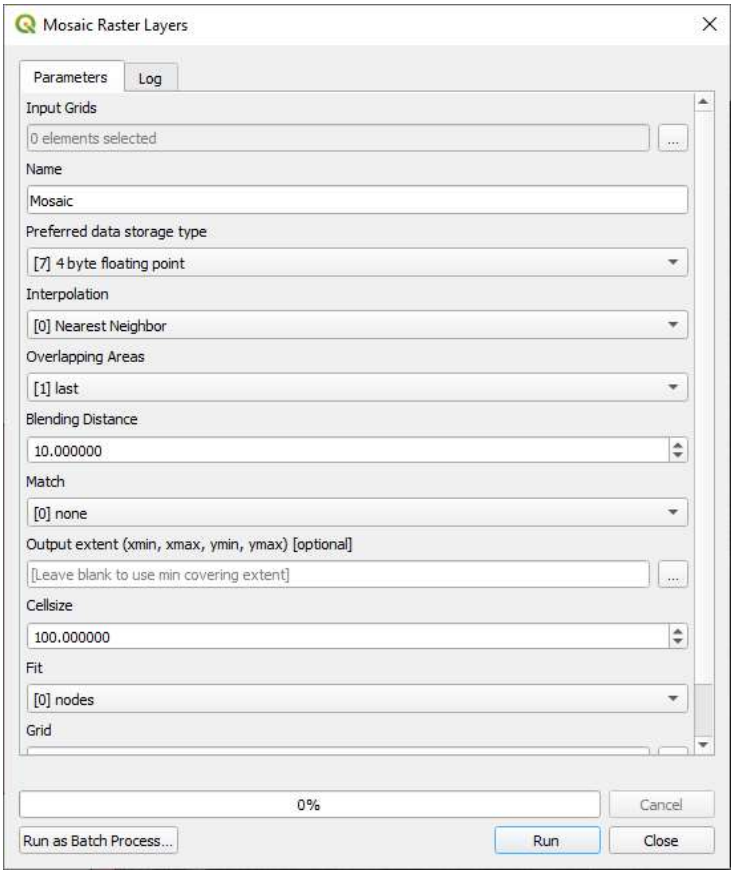
Although there are algorithms for mosaicking several bands in one step, band-by-band mosaicking is best as it gives room to assess the quality of the output product. In Salinity mapping, image bands of interest are those for Visible (Blue, Green, and Red), Infrared, and shortwave infrared bands (SWIR1, and SWIR2).

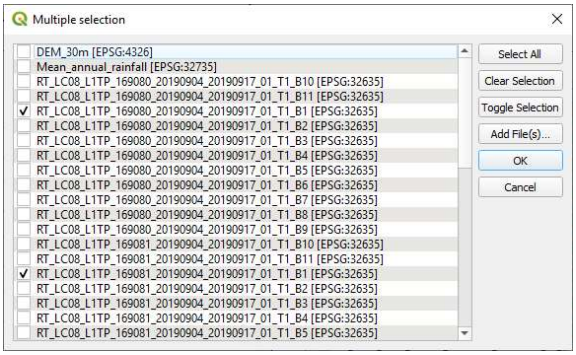
| Band category | Bands | Landsat OLI | Sentinel-2 | MODIS MOD09A1 |
|---|---|---|---|---|
| Visible | Blue | B2 | B2 | B3 |
| | Green | B3 | B3 | B4 |
| | Red | B4 | B4 | B1 |
| Infrared | IR | B5 | B8 | B2 |
| Shortwave Infrared 1 | SWIR1 | B6 | B11 | B6 |
| Shortwave Infrared 1 | SWIR2 | B7 | B12 | B7 |

Starting with Band1, vertically overlapping images covering the country are selected and mosaicked. This is done by first typing the word *mosaic* in the *Processing Toolbox* search space and selecting SAGA *Mosaic Raster Layer* function. A *Mosaic Raster Layers* window opens.

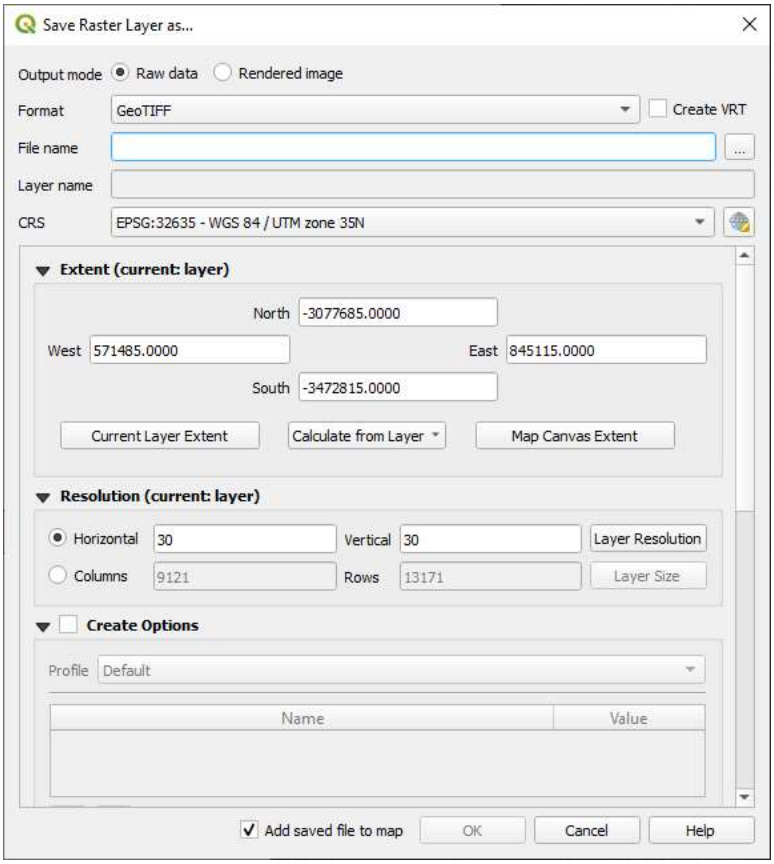
Leave the name as *Mosaic* and default *4 byte floating point* as *Preferred data storage type*. Change interpolation from *Nearest Neighbor* to *Bicubic Spline Interpolation*. Change *Overlapping Areas* from *Last* to *mean*. Leave the blending distance as default 10, but change *Match* to *regression*. Right-click one of the images in the Layers Window, and view the properties (under Information, check and copy the pixel size without the negative sign). Insert the correct pixel size in the space marked 100.0000 using the copied pixel size from the layer properties. Lastly, change the *Fit* from *nodes* to *cells*. At this point, the mosaicking algorithm is ready and clicking *Run* button at the bottom will initiate the process.

After mosaicking, the image is loaded into QGIS view. NB: Ignore any reported errors in the log. Save the image as geoTIFF (right-click the image, choose *Export*, then *Save as* and a window comes up)




Click *Input Grids* and *Multiple selection* window comes up. Select only files corresponding to one band at a time. For example, in the above image only Band 1 is selected (checked) from the two sets of overlapping images




Choose the output folder and file name by clicking the three dots at the end of the space in front of *File name.*

Remember to save this file in the folder containing the corresponding unzipped files from the image download.

Call the name *Mosaic01* (showing band1 mosaic part 1)

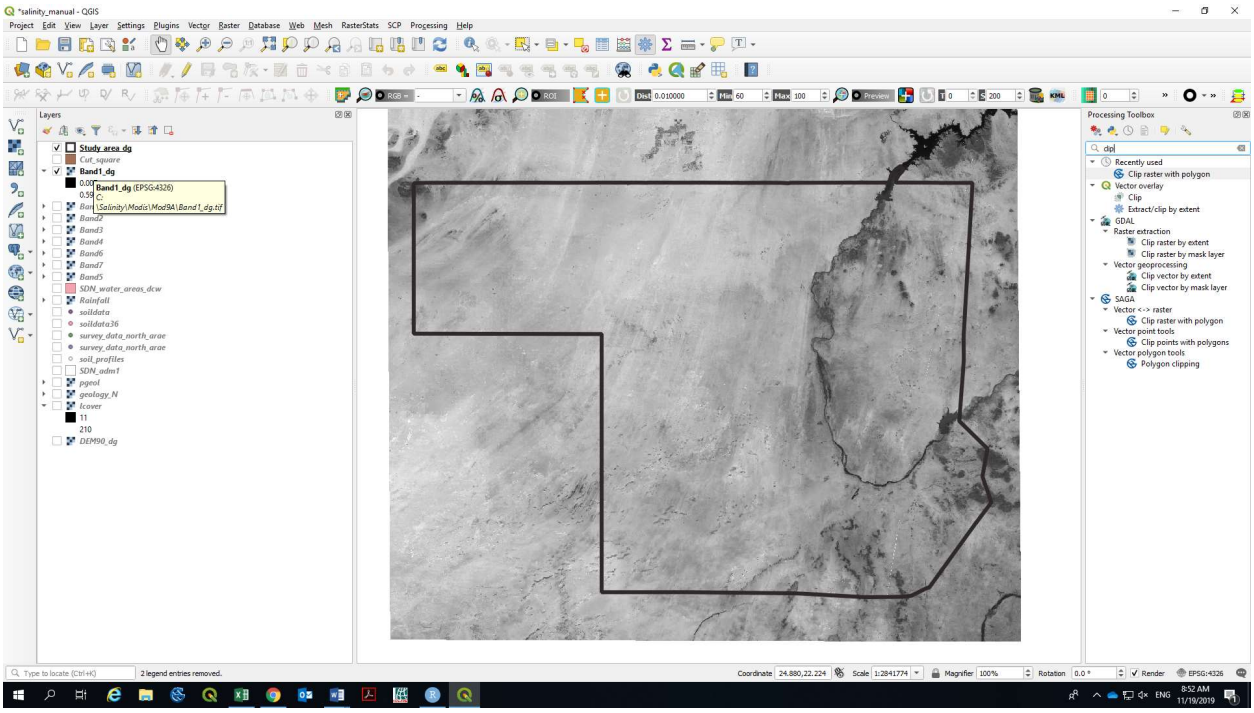
Repeat the mosaicking for all the required bands so that at the end, there is mosaic01, mosaic02, mosaic03, mosaic04, mosaic06, and mosaic07. Again, repeat the second set of overlapping to produce mosaic11, mosaic12, mosaic13, mosaic14, mosaic16, and mosaic17. Finally repeat mosaic of the mosaic to obtain mosaic1, mosaic2, mosaic3, mosaic4, mosaic5, mosaic6, and mosaic7. These are the raster images ready for clipping.

Step 3: Clipping Images

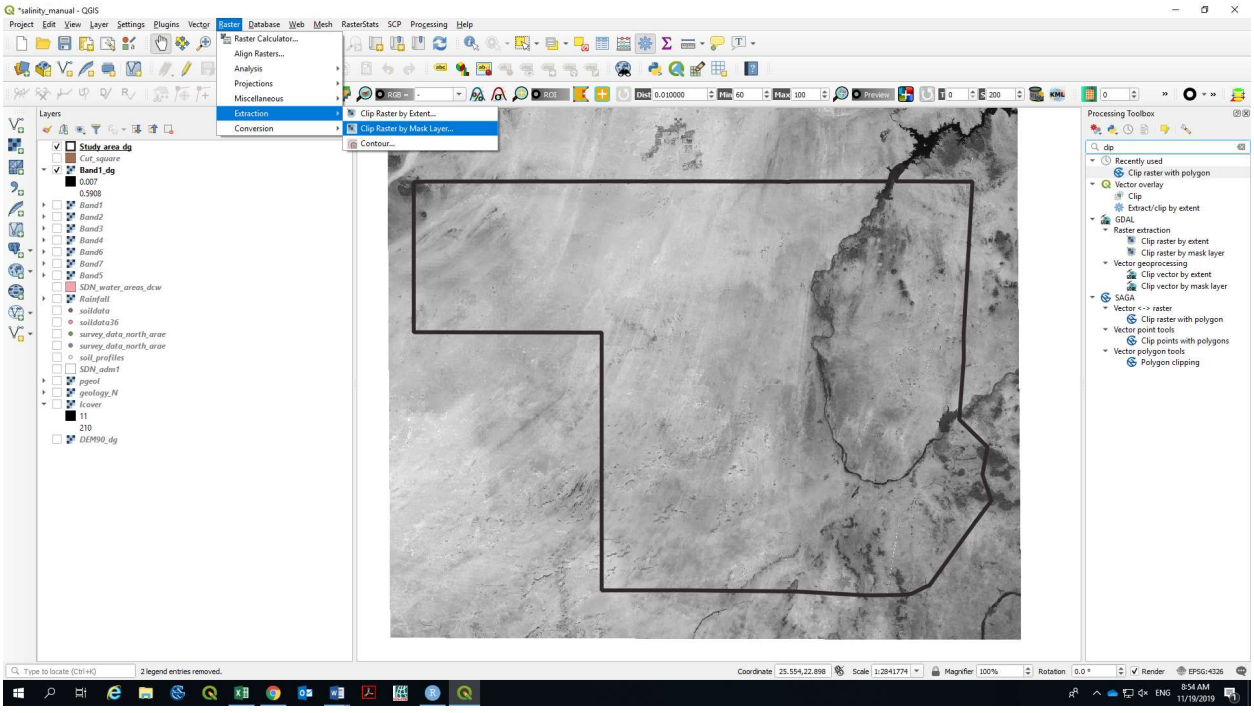
Clipping an image requires the following:

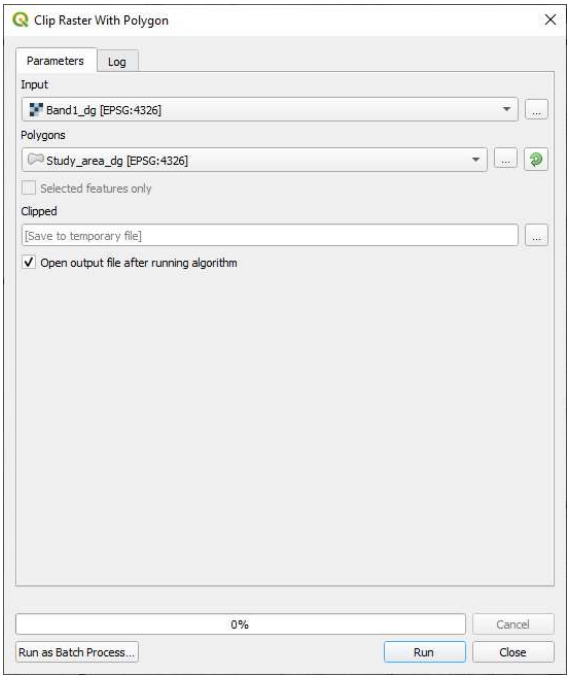
- Vector layer for clipping
- Mosaicked image to clip
- Both mosaicked image and vector layer may need to have similar CRS projection

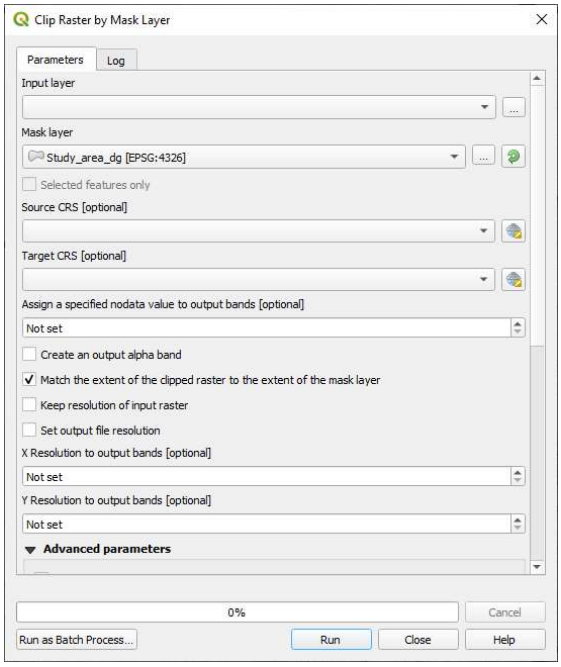
Overlay the vector layer on the mosaicked image. Place the cursor on each layer name and view the CRS projection. If the image and the vector layers have similar coordinate reference system (CRS) projection, then the SAGA *Clip raster with polygon* tool is used. This tool is strict on having similar CRS. It is accessed by typing clip raster in the *Processing Toolbox* search window as shown below.



Alternatively, going through *Raster button* and selecting *extraction* then *Clip RASTER BY MASK*



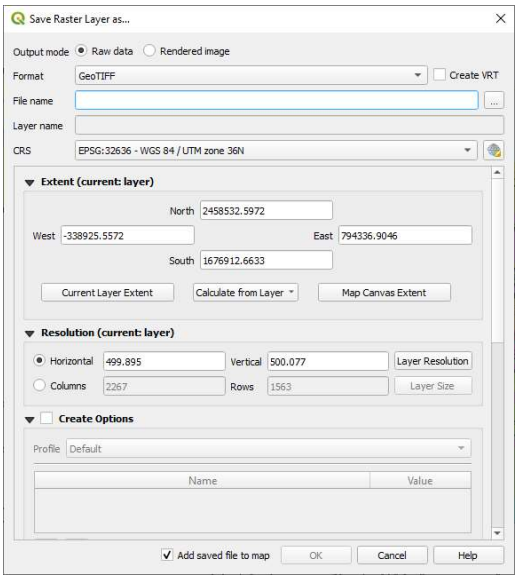



If *Clip-Raster-With-Polygon* tool is used, a new window for specifying clipping parameters shows up. In *Input* option, select the mosaicked image and in *Polygon* option select the vector layer for clipping. The click *Run*. If *Clip-Raster-by-Mask* tool is used, a new window for specifying clipping parameters shows up. In *Input* option, select the mosaicked image and in *Polygon* option select the vector layer for clipping. Leave the other options as is and click *Run*. The output will be displayed in the QGIS view. It can be saved/exported to file.

Step 4: Exporting Images

Right-click the layer name in the Layer Panel, then select *Export* and select *Save as*.




Choose the folder into which the file is to be saved and give a name. Then click *Save* button to return to the *Save Raster Layer as…* Then click OK to save the layer.

NB: It may be necessary to add the projection notation to the layer naming during file-saving process. For example, saving UTM projected DEM *dem_utm36N* gives more meaning to the layer name.