Sample solution – Vegetation indices

Project setup

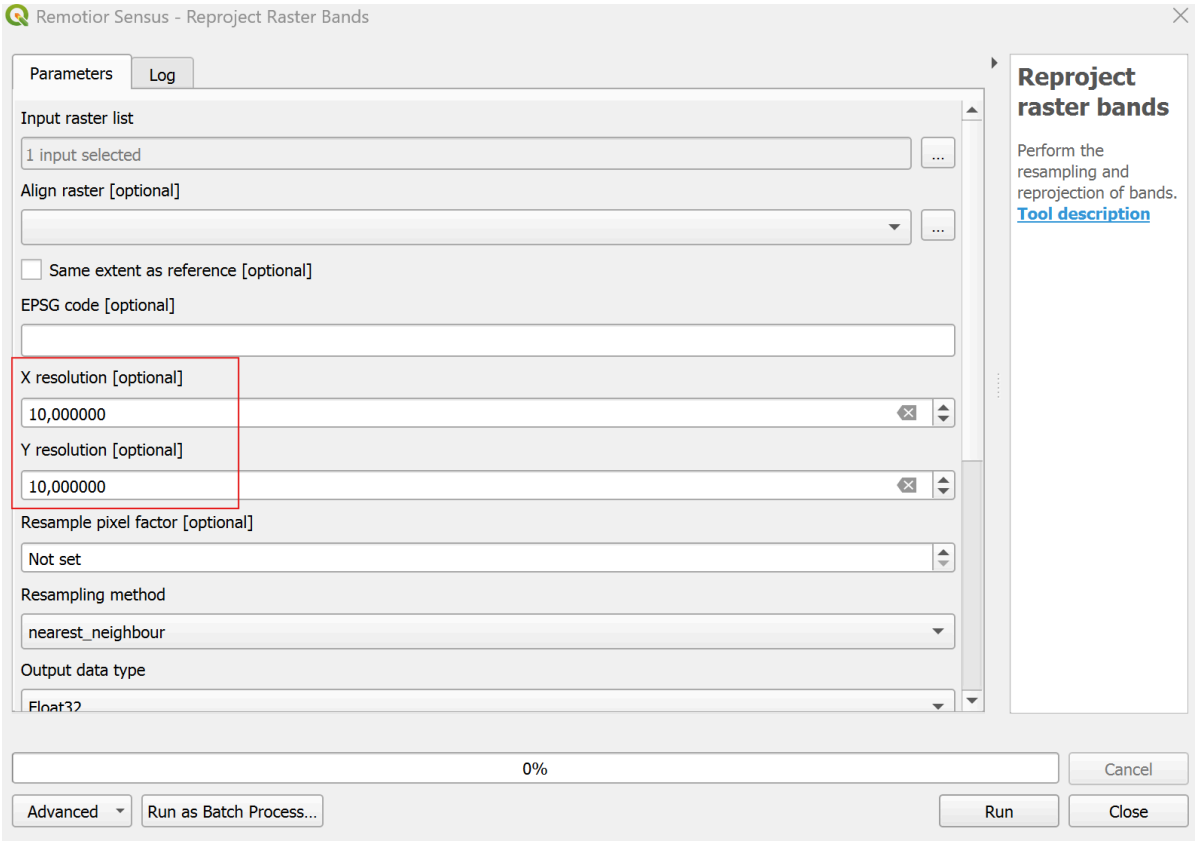
- Start QGIS and create a new project file.
- Get a background map using **Web -> QuickMapServices -> OSM -> OSM-Standard**.

Load Sentinel-2 bands into QGIS

- Navigate to the Sentinel-2 folder (.SAFE)., where you should select the following bands for this analysis:
    - **B03** (Green, 10m)
    - **B04** (Red, 10m)
    - **B08** (NIR, 10m)
    - **B11** (SWIR, 20m)
- If you are unsure why we need to select these bands, you can go back to the 9a slides and check out the formulas of the Vegetation Indices

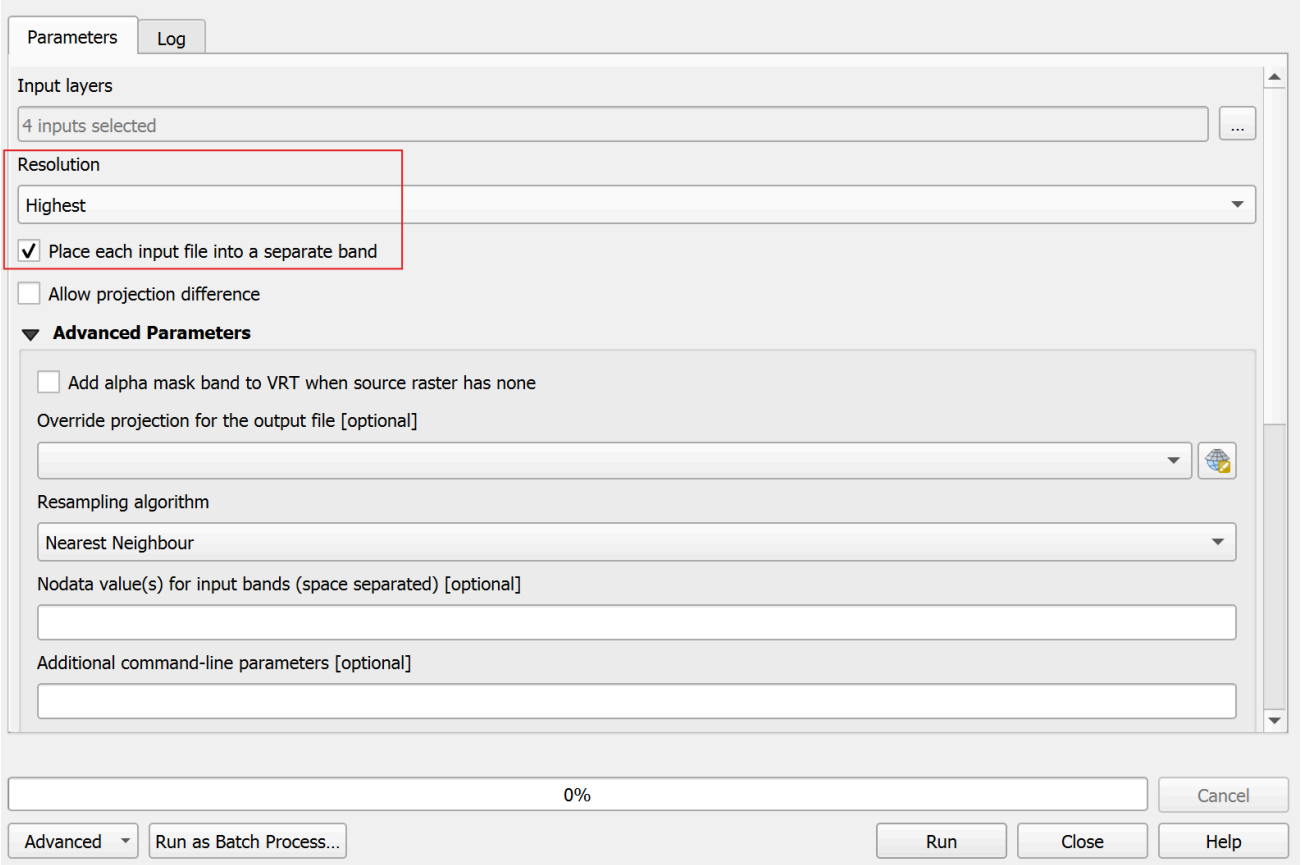
Resample B11 to 10m

- B11, with its 20m resolution, is too coarse compared to our other bands, so we need to resample it. The resampling tool is part of the SCP plugin -> PreProcessing -> Reproject Raster Bands. Simply input B11, set the X and Y resolution to 10 and run the Too

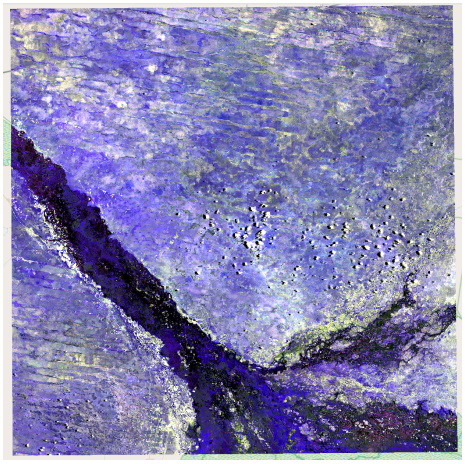


Create a virtual raster

- Next, we can merge the 4 bands into one cohesive raster image by using the tool “Create Virtual Raster” in the Miscellaneous tab of the raster tools. Input the bands, select ”highest” for resolution, and remember to tick the box that ensures that all input layers will be treated as individual bands.

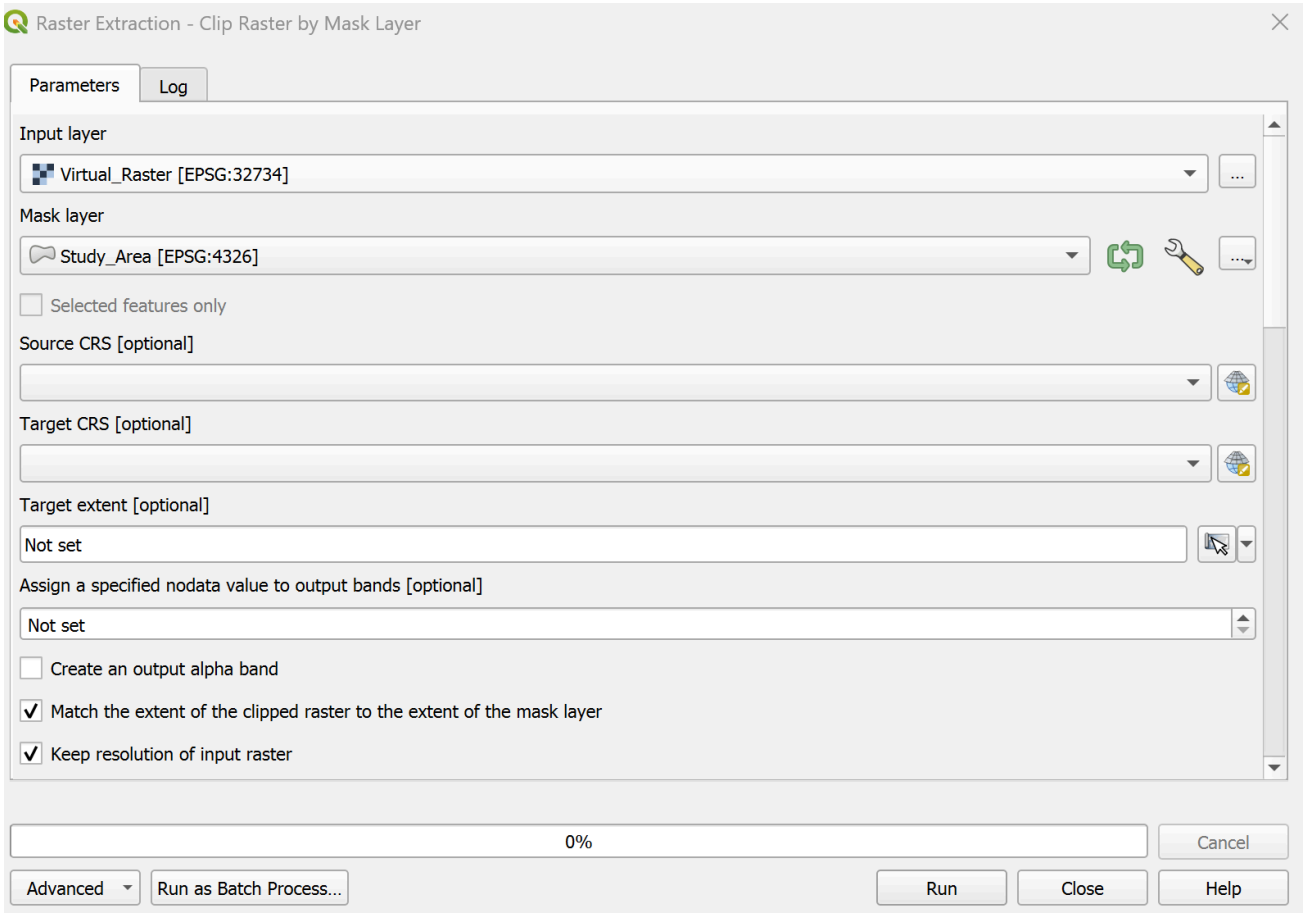


Result:



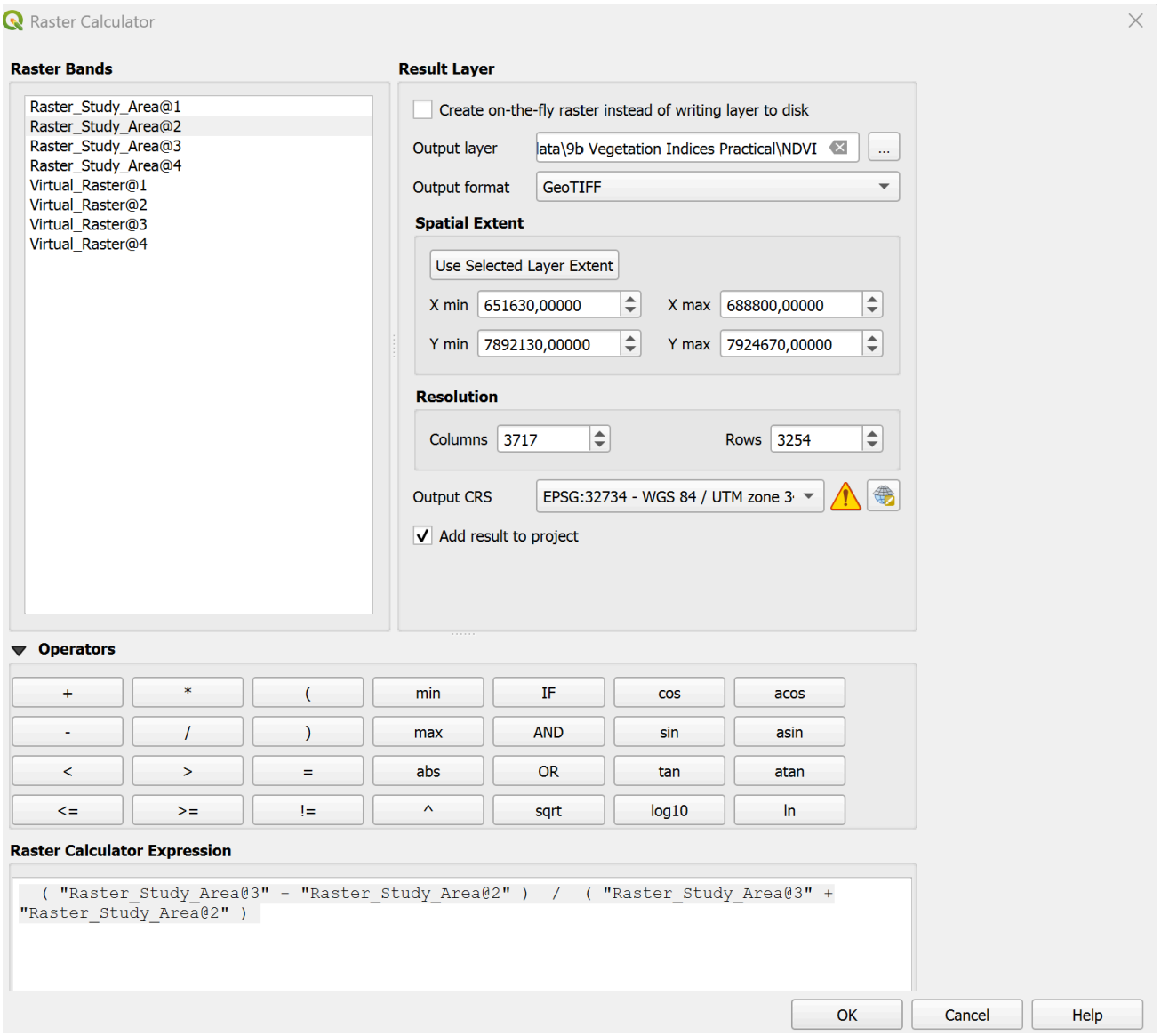
Clip raster to study area

- Now, we can clip the raster to the actual size of our study area to make the analysis more computationally efficient. Use the Clip Raster by Mask Layer Tool under Raster -> Extraction.



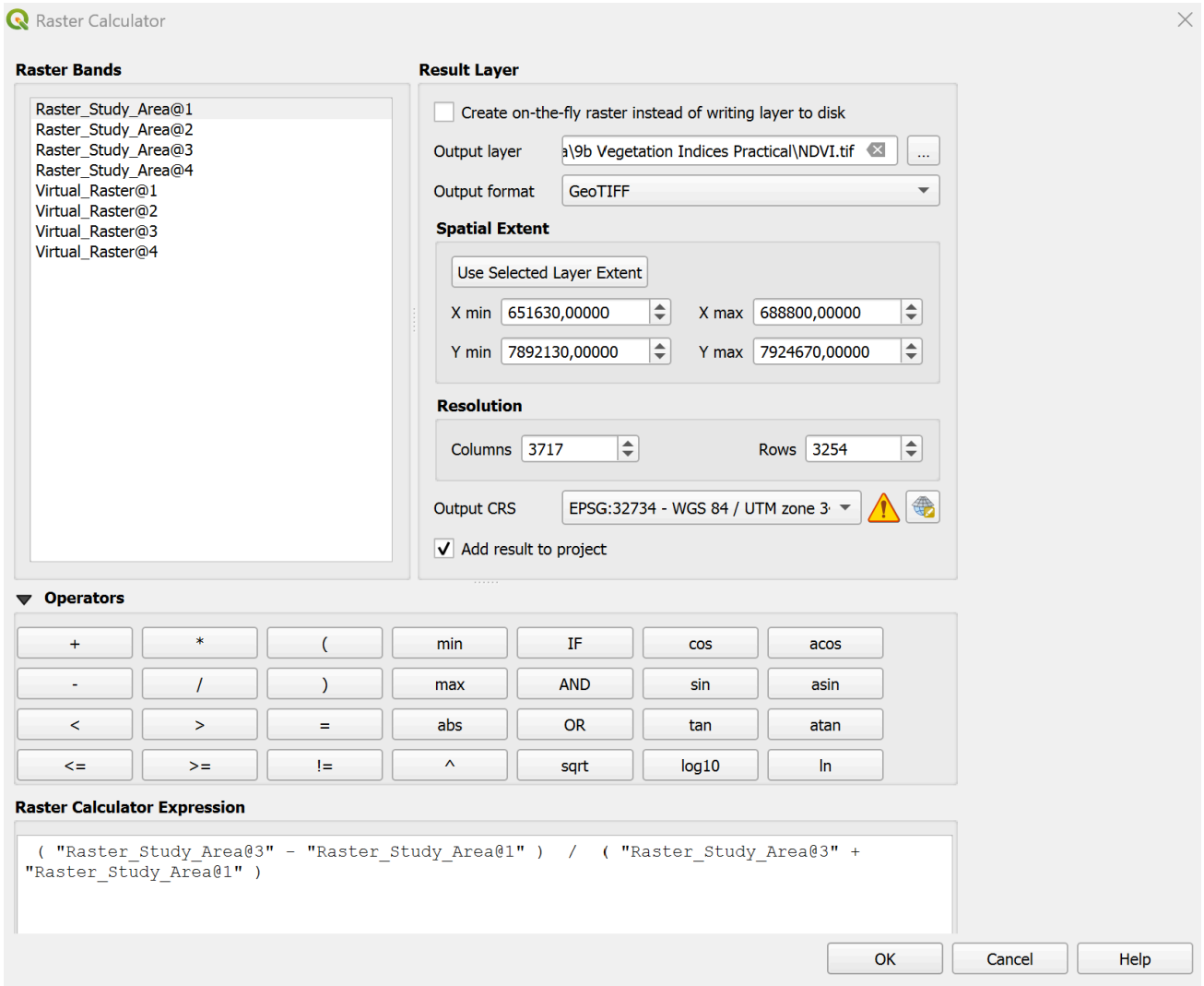
Calculate the NDVI

- For the Vegetation Index Calculations, we can use the Raster Calculator. Use the Formula provided in lecture 9a to calculate the NDVI and save the output as a new Raster file.
- **Formula:** `( "Raster_Study_Area@3" - "Raster_Study_Area@2" ) / ( "Raster_Study_Area@3" + "Raster_Study_Area@2" )`



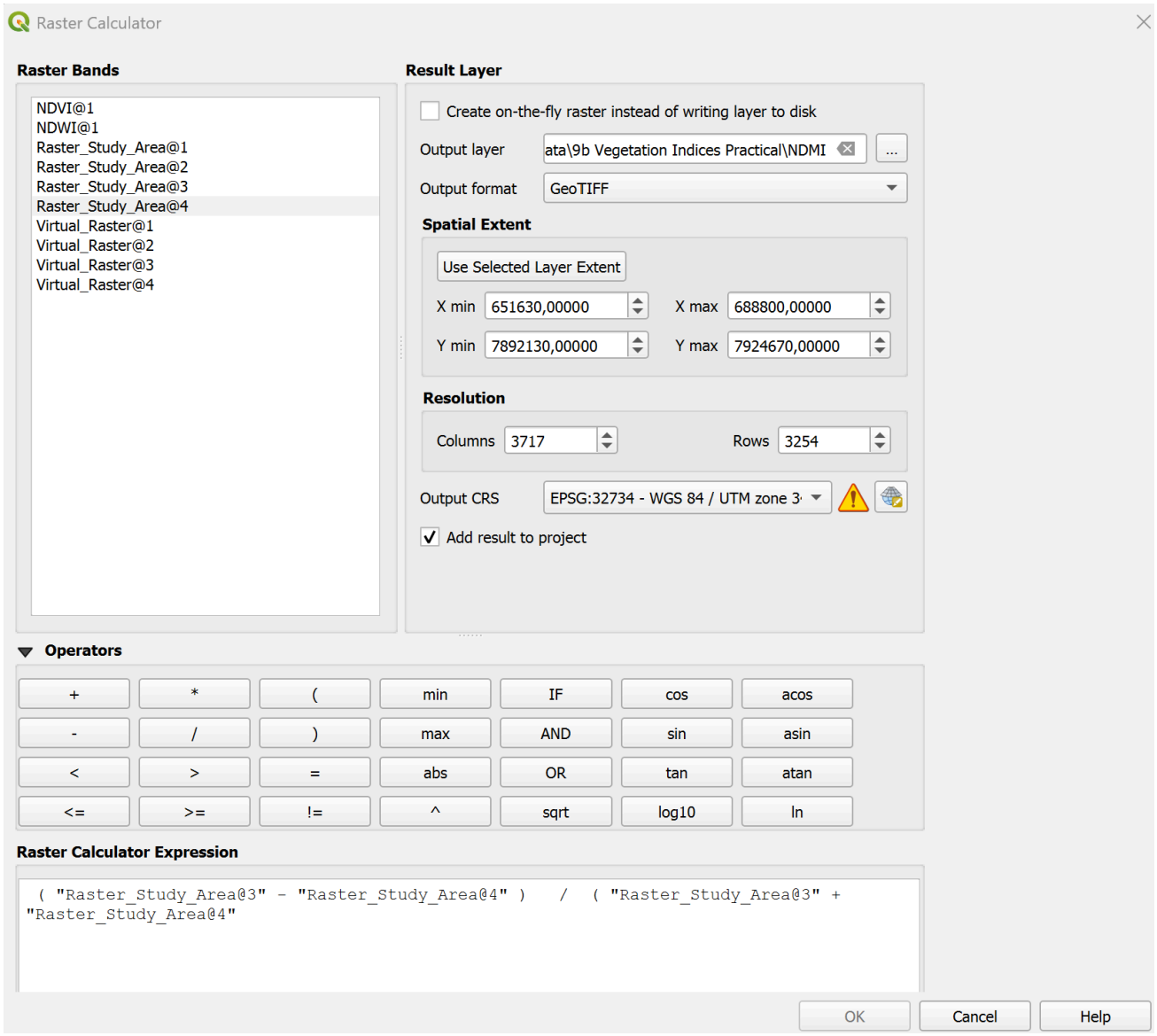
Calculate the NDWI

- For the Vegetation Index Calculations, we can use the Raster Calculator. Use the Formula provided in lecture 9a to calculate the NDWI and save the output as a new Raster file.
- **Formula:** `( "Raster_Study_Area@3" - "Raster_Study_Area@1" ) / ( "Raster_Study_Area@3" + "Raster_Study_Area@1" )`



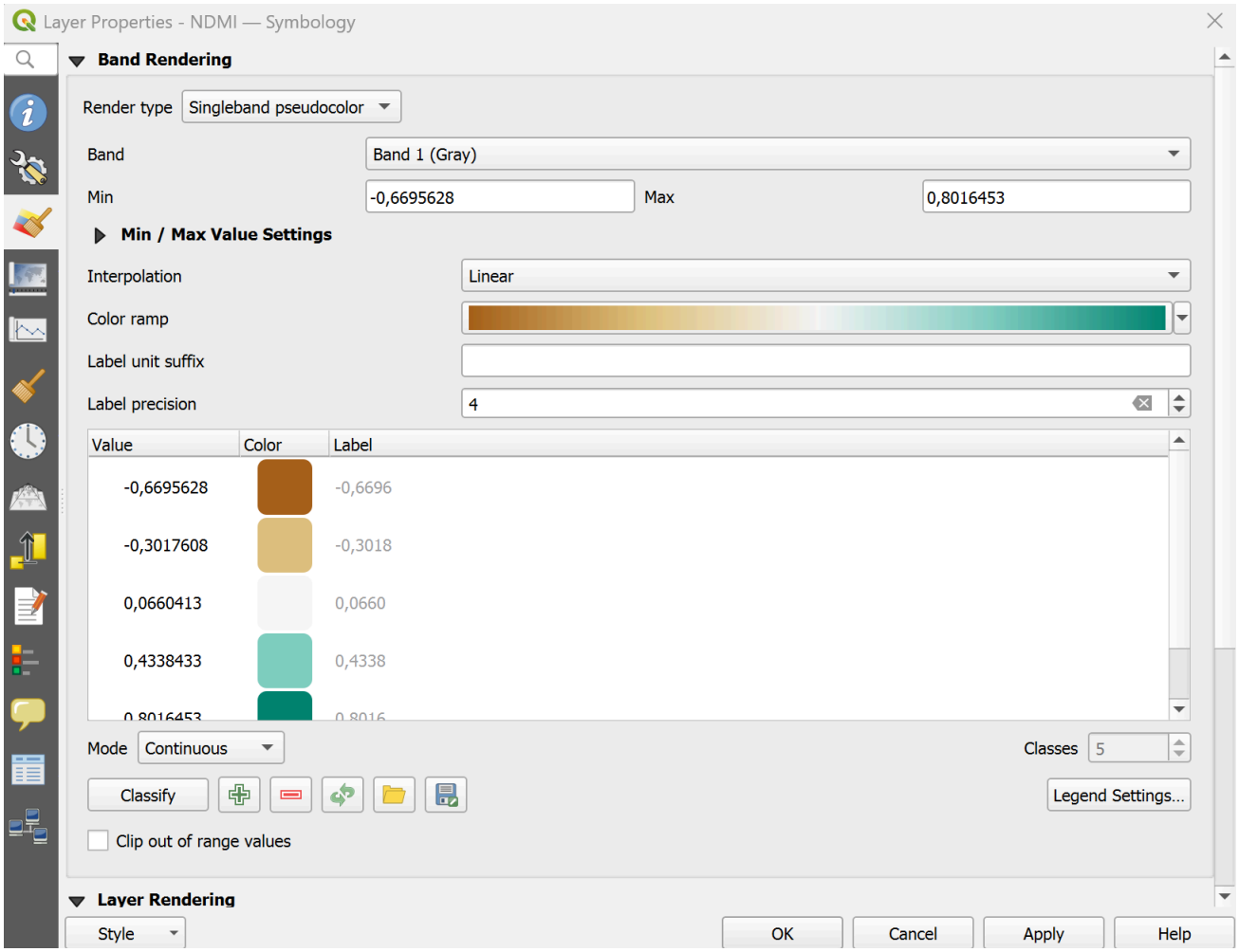
Calculate the NDMI

- For the Vegetation Index Calculations, we can use the Raster Calculator. Use the Formula provided in lecture 9a to calculate the NDMI and save the output as a new Raster file.
- **Formula:** `( "Raster_Study_Area@3" - "Raster_Study_Area@4" ) / ( "Raster_Study_Area@3" + "Raster_Study_Area@4" )`



Designing the map

- In the Layer properties, set the Symbology to Singleband Pseudocolour and choose a fitting colour ramp for your Index, eg, NDVI is traditionally red to green!



Now all that is left to do is create a map showing the three vegetation Indices side by side!