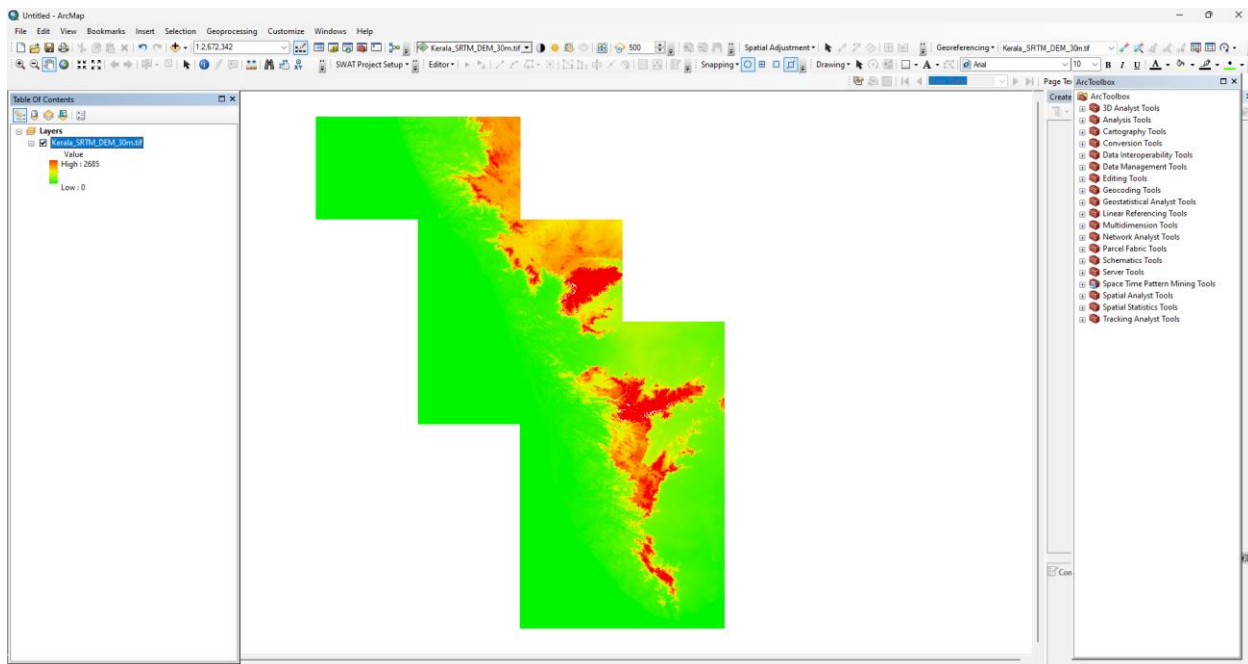# SOP for Identifying an area as Upper/Middle/Lower Ridge based on Watershed Concept in a Grama Panchayath

1. Open the provided SRTM Digital Elevation Model (DEM) of 30 m resolution in ArcGIS Software.

2. Select all the watersheds that fall within the Grama Panchayath Boundary.
   a. Here, Omassery Grama Panchayath of Koduvally Block in Kozhikode District is taken as a sample.
   b. Open all the 7 Watersheds that fall within the Omassery Grama Panchayath.
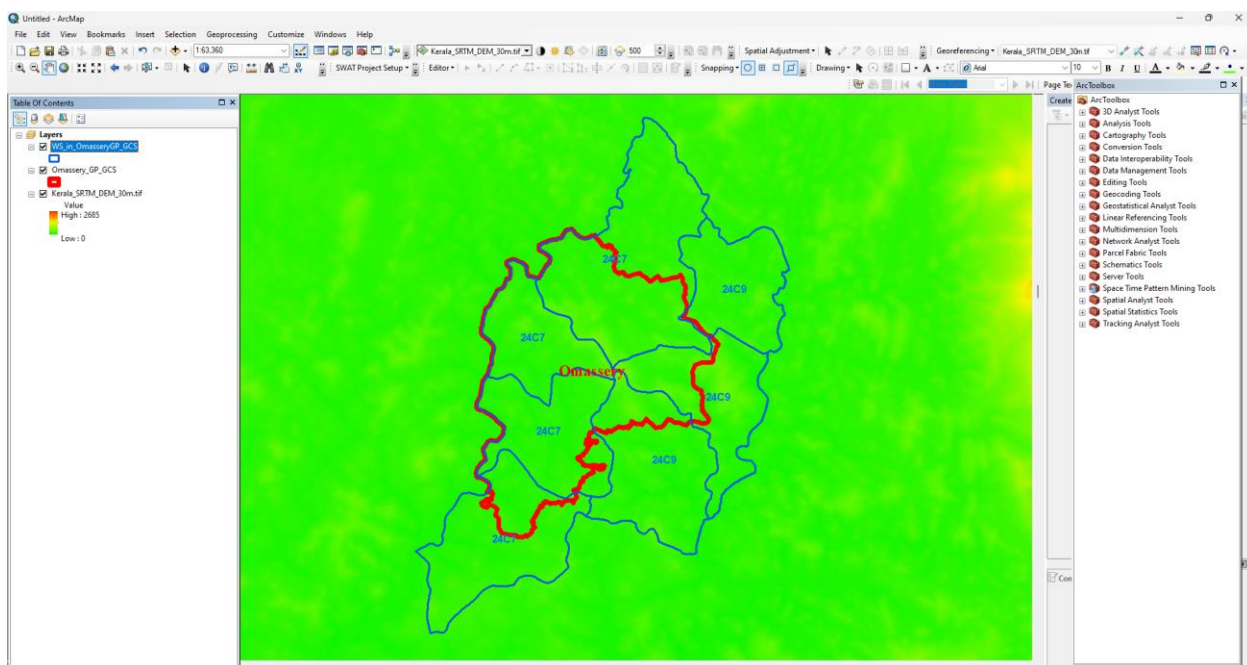
3. Extract these selected watersheds as separate shapefiles.
   a. These 7 watersheds are extracted as separate shapefiles as shown in the image.
      i. Select each watershed from the attribute table of the shapefile "WS_in_OmasseryGP_GCS".
      ii. Right Click on the shapefile to extract and save each watershed as a separate shapefile.
      iii. Then separate shapefile for all 7 watersheds will be created as shown in the images. (W1_in_OmasseryGP_GCS, W2_in_OmasseryGP_GCS, ……..., W7_in_OmasseryGP_GCS).
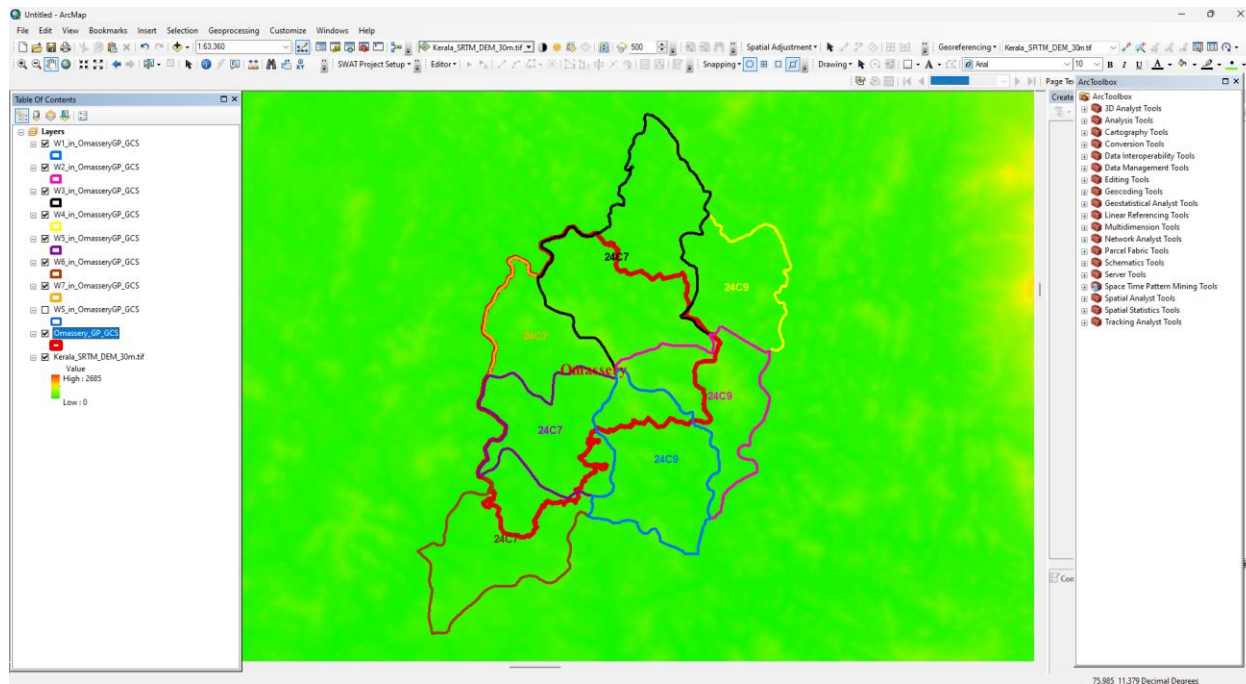
4. Clip the Raster file (DEM) using each watershed.
   a. Arc Tool Box → Spatial Analyst Tool → Extraction → Extract by Mask → Right Click and give "Batch Operation".
   b. In the "Extract by Mask" Dialogue box, select "Kerala_SRTM_DEM_30m.tif" as Input Raster for every row.
   c. Select each watershed (i.e., Watershed 1 to 7) as "Feature Mask Data" in each row.
   d. Provide your desired Output Folder for saving the "Clipped DEM" in the "Output Raster" column, as shown in the below image.
   e. Click OK.
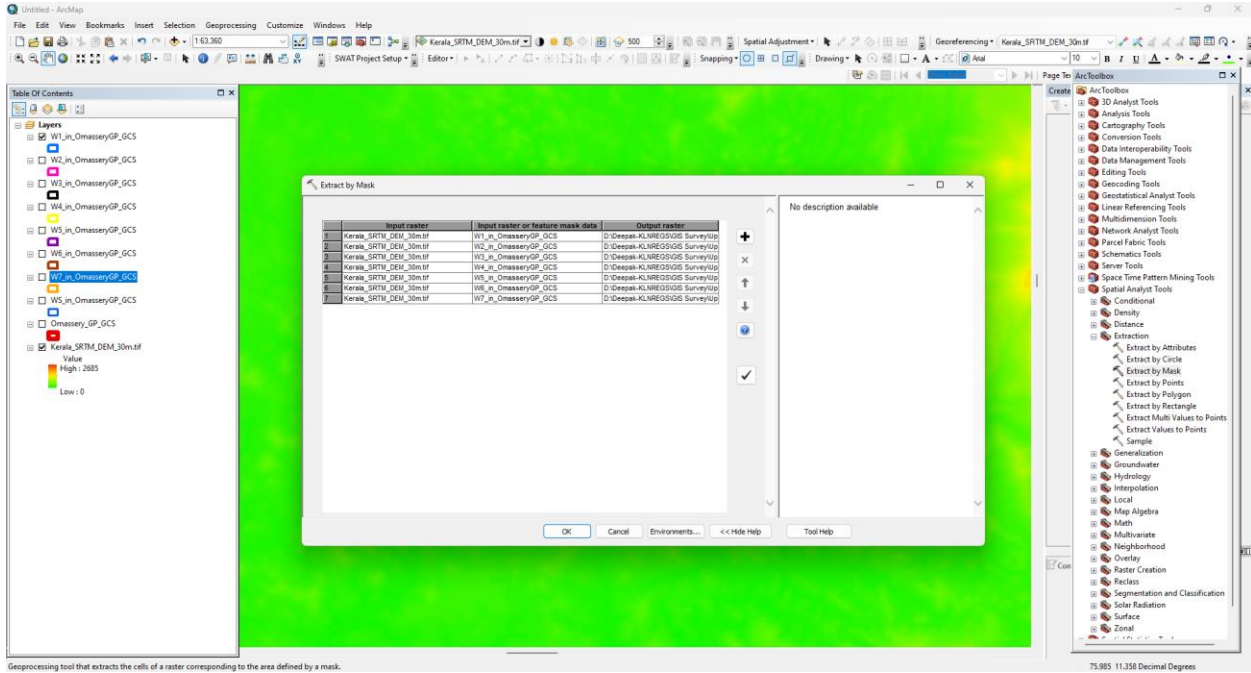
5. The output DEM of each Watershed will be generated as shown in the image.
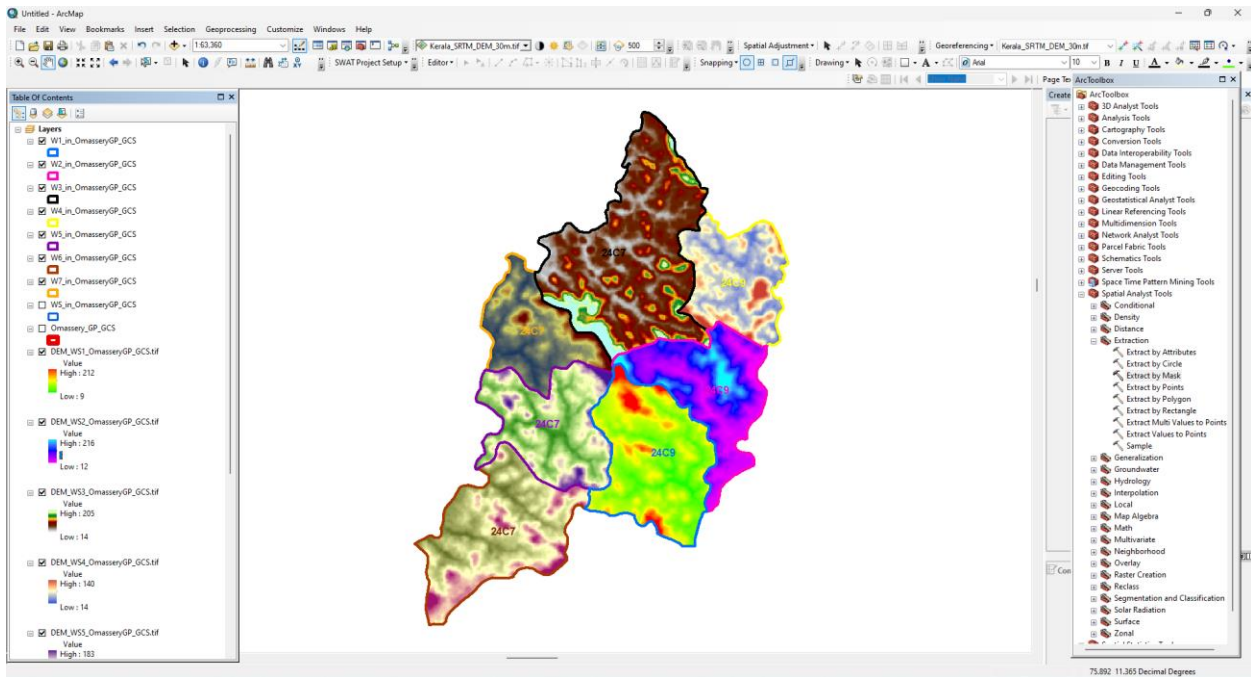
6. Classify each DEM (7 DEMs) into 3 Classes (i.e., into Lower, Middle, and Upper Ridge) based on its elevation value, using the "Quantile Method", in the Symbology Part of its Layer Property.

   a. Right Click the DEM File → Properties → Symbology → Classified → Classify → Select "Quantile Method" → Set Value 3 for "Classes" → Click OK.

   b. Repeat the procedure for the remaining DEMs of each Watershed.
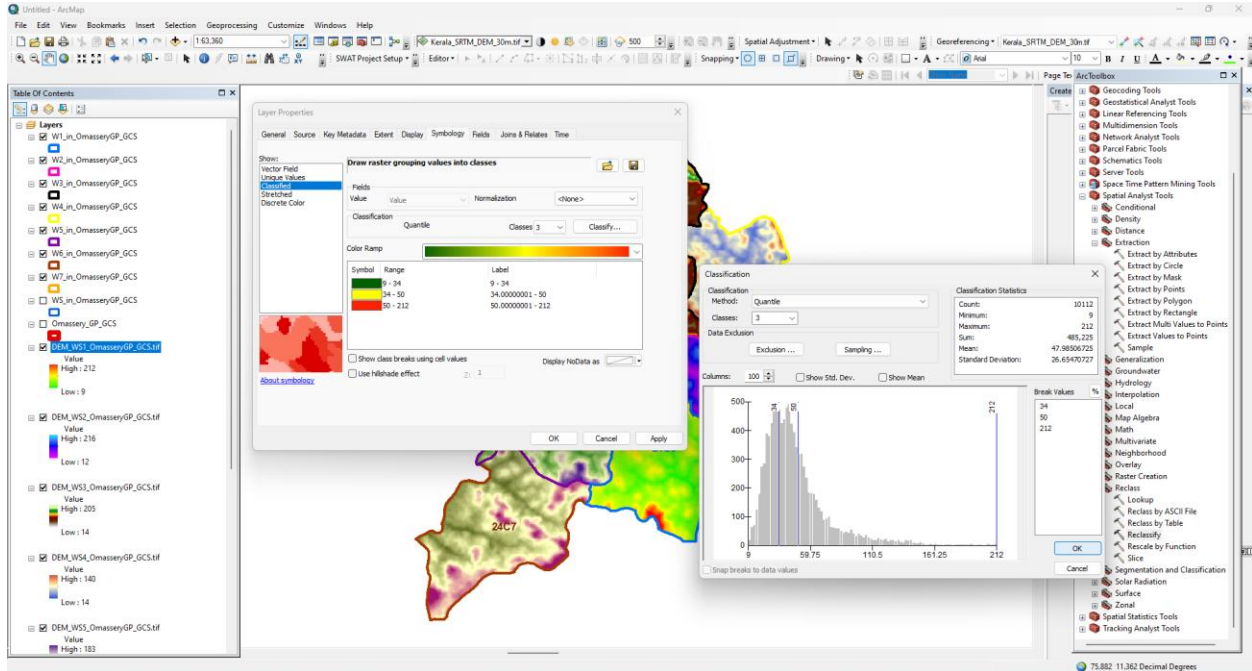
f. In the Output DEM, the range of elevation value will be altered as shown in the image below (Sample).
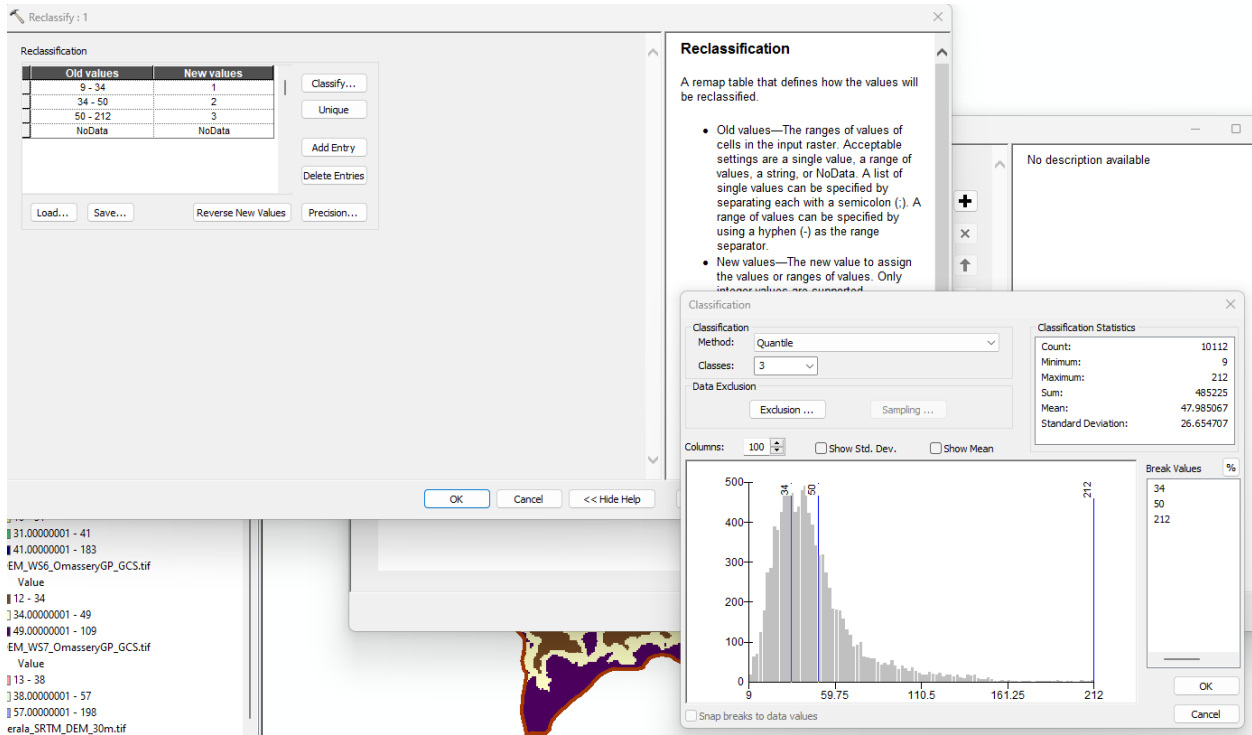

7. Reclassify each DEM into 3 Classes.
    a. Arc Tool Box → Spatial Analyst Tool → Reclassify → Right Click → Batch.
    b. In Reclassify Dialogue Box, Input each DEM (DEM 1 to 7) as the Input Raster & Assign Value in each Reclass Column.
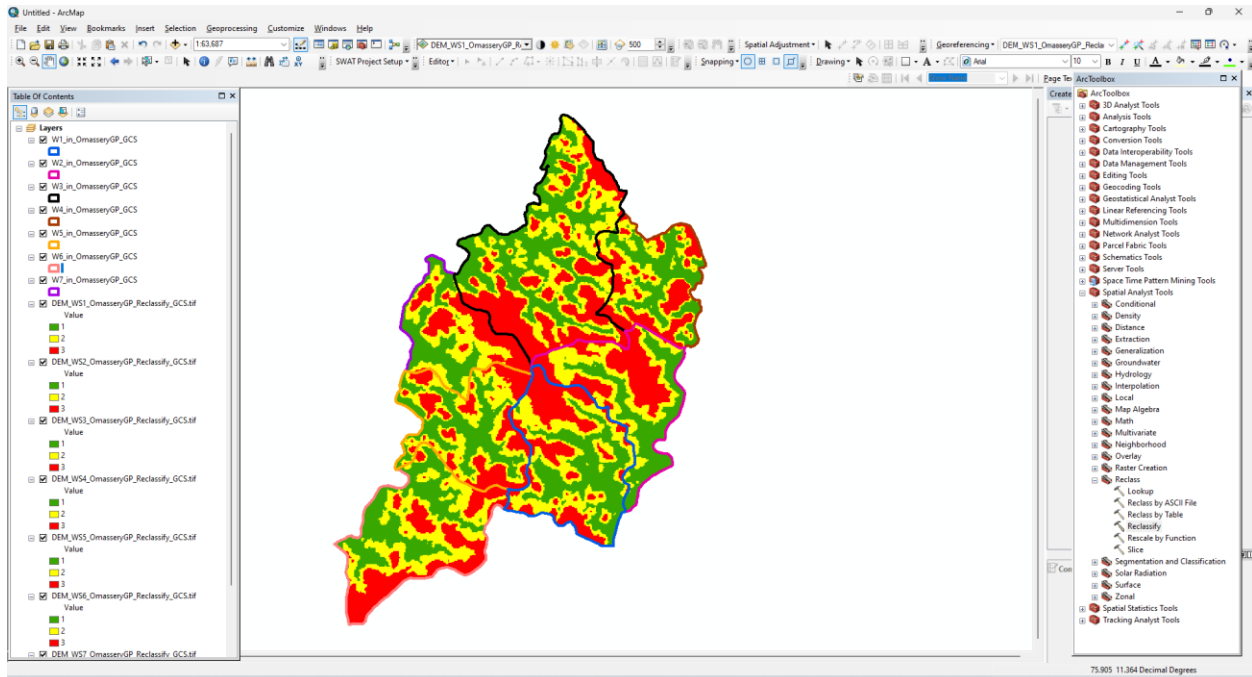
c. Under Reclassification Column, Double Click on each row → Classify → Assign Method as "Quantile" → Set Value 3 for "Classes" → Click OK (as shown in the image below).


d. Set your Output in the desired Folder under the "Output Raster" Column and Click OK.

e. Open the all the Newly Generated 7 DEMs as in the image below.

NREGA/1454/2023-E4

286775/2024/E NREGS

8. Merge these 7 DEMs into a single Raster.
   a. Arc Tool Box → Data Management Tools → Raster → Raster Dataset → Mosaic to New Raster.
   b. In the "Mosaic to New Raster" Dialogue Box, add all the 7 Newly Reclassified DEMs as the "Input Rasters".
   c. Select the desired Output Location Folder.
   d. Give the Preferred Name for the Merged Raster with ".tif" as the extension.
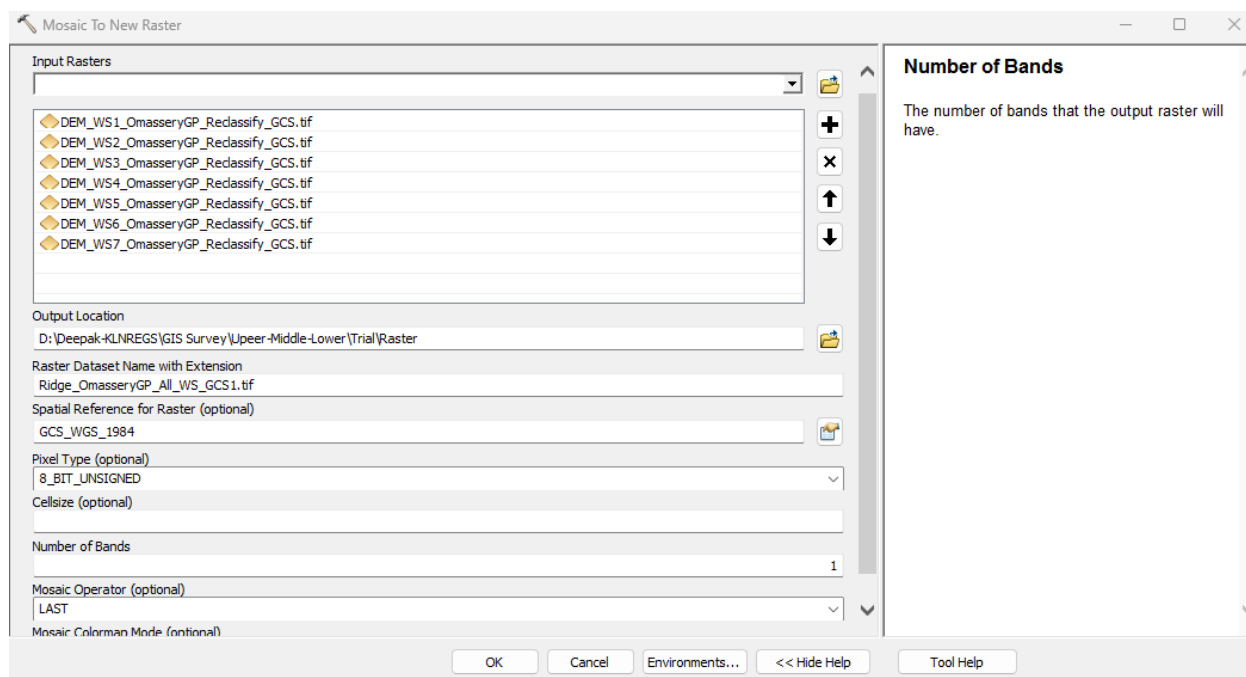
   e. Columns like Pixel Type, and Cell Size are optional. If providing any values in these columns, either give values that are default or values of the Input Rasters.
   f. Value of the row "Number of Bands" has to be entered as that of the Input Rasters (Here it is 1).
   g. Click Ok.
   h. The Newly Generated Mosaiced Raster (DEM) is shown below.

286775/2024/E NREGS
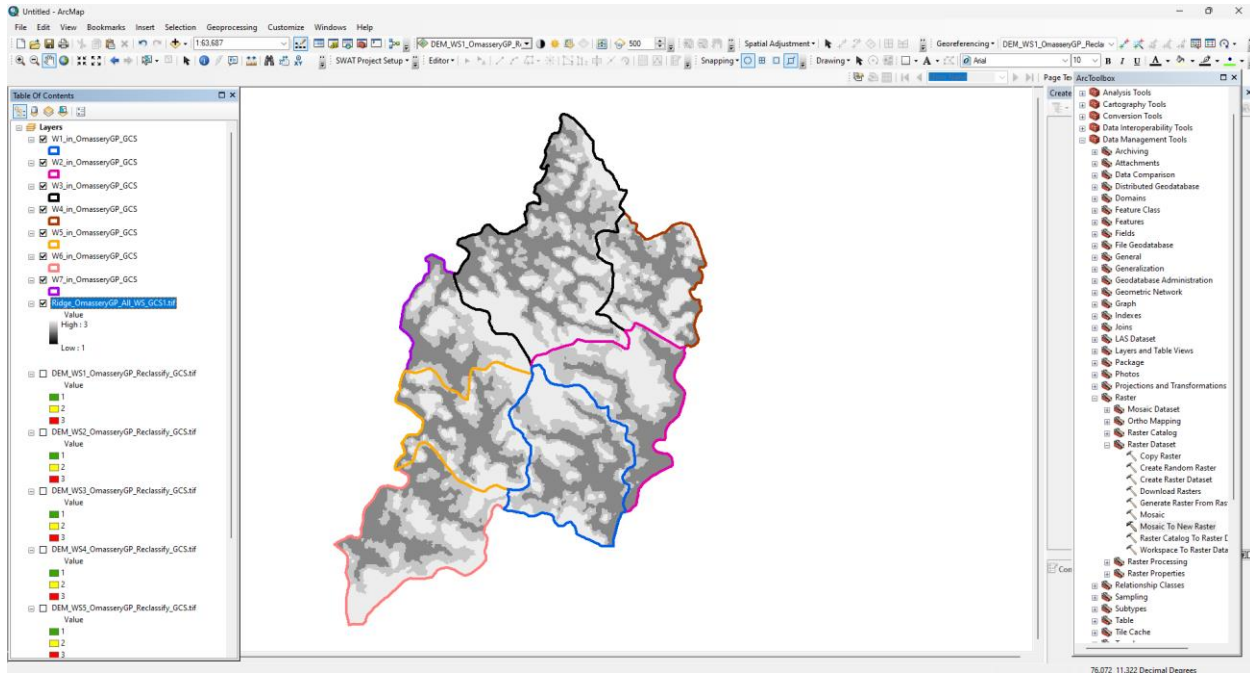

9. Clip the Newly Generated Mosaiced DEM with the Grama Panchayath Boundary.
   a. Arc Tool Box → Input Raster (Input the Newly Mosaiced DEM) → Output Extend (Provide the Grama Panchayath Boundary) → Enable the "Use Input Feature for Clipping Geometry" → Output Raster Dataset (Select the desired folder) → Enable "Maintain Clipping Extend" → Ok.
   b. An output will be generated as shown below.
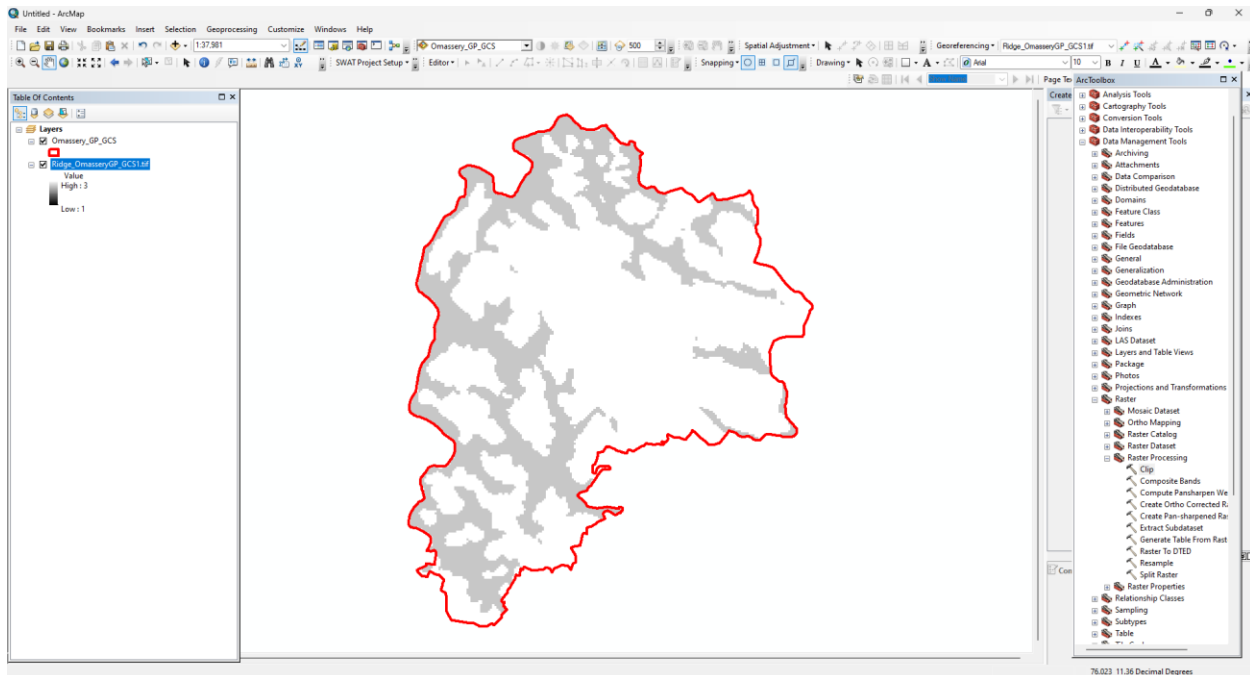
10. Assigning Green, Yellow, and Red Colours for the Lower, Middle, and Upper Ridge areas of the Grama Panchayath, respectively.
    a. Right Click on the Newly Clipped DEM → Properties → Symbology → Colour Scheme → Provide Green-Yellow-Red Colour Combination, as shown below.
    b. Find the Area of each Ridge (in Sq.km).
        i. Right Click the DEM → Open Attribute Table → Add New Field "Area_Sqkm" → Assign "Float" to the Data Type → Ok.
        ii. Right Click on the Heading "Area_Sqkm" in the attribute Table → Field Calculator → In the VB Script Parser type the equation to get the area of each Class/Ridge.
        iii. The equation is, Area_Sqkm = [count]*30*30/1000000.
        iv. Since the Quantile Method was used, the area of all three classes (i.e., Lower, Middle, and Upper Ridge) will be almost the same.
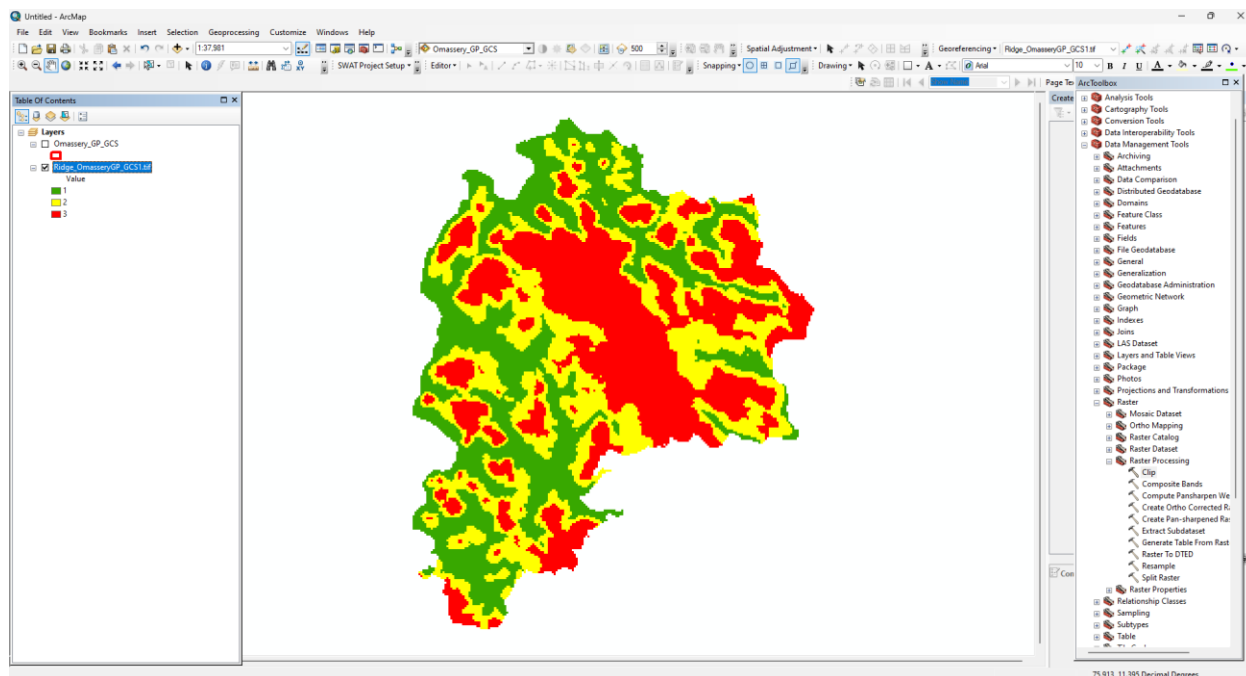
11. Convert the Colour Categorized DEM into KML.
    a. ArcTool Box → Conversion Tools → To KML → Layer to KML → Select the Colour Categorized DEM as Input File → Set Preferred Output Folder → Click Ok.
12. Identifying in which part of the ridge the proposed works are going to be undertaken by the Grama Panchayath.
    a. Make this KML File available to Grama Panchayaths and Open it in Google Earth.
    b. Ask the Grama Panchayath Level Staff to Plot the Latitude and Longitude Value of the proposed work location, collected from the field, in Google Earth.
    c. Mark the work as
        i. Upper Ridge, if the proposed work falls in Red Colour,
        ii. Middle Ridge, if the proposed work falls in Yellow Colour, and
        iii. Lower Ridge, if the proposed work falls in Green Colour.