

6SSG3028 Environmental Remote Sensing II: Formative Portfolio Template

Student Number 1894160

The Formative Portfolio is based on Tasks associated with Practical 1.

This coursework portfolio should be completed as you go through the practical classes. At the end of each practical there will be a set of Portfolio Tasks for you to complete which require you to apply what you can learnt during the class. Your answers to these tasks (images, maps, plots and text answers etc.) should be added into this document in the appropriate place. Most of the information required to answer the Portfolio Tasks is contained in the practical classes. For some tasks, you will also need to do your own research.

The tasks for each Practical class are worth a maximum of 10 marks. All figures and tables should be well-presented and include a detailed caption. Free text answers should include properly formatted equations where appropriate. To find out more about the marking criteria used to assess the portfolio tasks, please refer to the Module Syllabus on KEATS.

PRACTICAL 1

Portfolio Task 1A. Create a (relatively) cloud free Landsat 8 true colour composite image of your chosen study area.

Include a screen shot of the true colour composite image. (Insert figure and caption below)



Figure 1: Western coast of Cyprus & Akrotiri Peninsula

Describe the main features visible in the image (max 200 words).

Figure 1 shows western coast of Cyprus with Akrotiri Peninsula in the middle. There are two bays that bound the peninsula: Episkopi Bay (west); Akrotiri Bay (east). Crucial feature is Akrotiri Salt Lake - the largest inland water body in the island of Cyprus. It is 10.65 km², maximum depth is 2.7 meters below the sea level, but ~55% of the lake is 30cm deep. This makes lake a crucial habitat for flamingos (*Phoenicopterus roseus*) that use this lake during migration season. The lake is classified as Important Bird Area (IBAs) of Cyprus. Souni Zanakia Forest – is one of the last forests in Cuprys that is still growing on the plain. Souni Zanakia is a coniferous forest and has rich mushroom season (autumn). Most popular species are Suillus and champignons.

Lastly, Limassol City is the second largest city on the island. It has Mediterranean climate – long & dry summers, snow is extremely rare. On average there is 41 rainfall days in Limassol. Coastline is mainly rocky and pebble beaches. Limassol experienced urban sprawl since 1977 that was poorly managed until 1990s, resulting in radial urban structure. Consequently, city has widespread proximity of incompatible land uses and serious shortages of open green space.

Portfolio Task 1B. Create geometries representing three different habitat/land cover types within your study area (e.g. forest, grassland, open water) and combine these into a feature collection with labels.

Visualise these different regions and include a screen shot showing all three geometries (Insert figure and caption below)

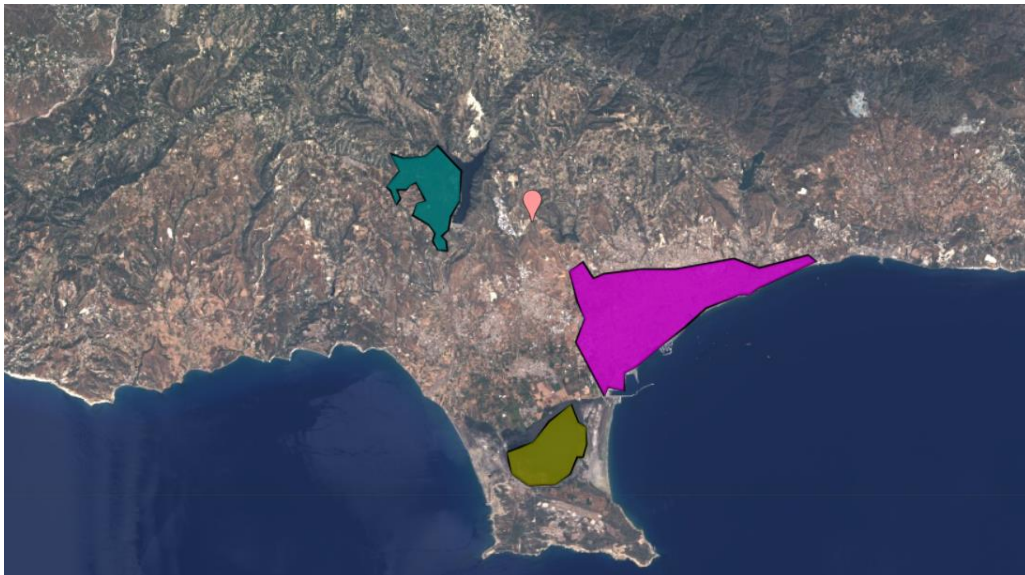


Figure 2: Three selected regions in Western Cyprus.

Dark Green – Soini-Zanakia Forest; Magenta – Limassol City; Olive – Limassol Salt Lake

Print the details of the feature collection and include a screen shot of the output in the console window.

```
Cyprus_regions
▼ FeatureCollection (3 elements, 2 columns)
  type: FeatureCollection
  ▼ columns: Object (2 properties)
    label: String
    system:index: String
  ▼ features: List (3 elements)
    ▼ 0: Feature 0 (Polygon, 1 property)
      type: Feature
      id: 0
      ▼ geometry: Polygon, 16 vertices
        type: Polygon
        ▼ coordinates: List (1 element)
          0: List (16 elements)
      ▼ properties: Object (1 property)
        label: Limassol_Salt_lake
    ▼ 1: Feature 1 (Polygon, 1 property)
      type: Feature
      id: 1
      ▼ geometry: Polygon, 29 vertices
        type: Polygon
        ▼ coordinates: List (1 element)
          0: List (29 elements)
      ▼ properties: Object (1 property)
        label: Soini_Zanakia_Forest
    ▼ 2: Feature 2 (Polygon, 1 property)
      type: Feature
      id: 2
      ▼ geometry: Polygon, 25 vertices
        type: Polygon
        ▼ coordinates: List (1 element)
          0: List (25 elements)
      ▼ properties: Object (1 property)
        label: Limassol_City
```

Portfolio Task 1C. Create an image collection from Landsat 8 data for any single month period. Produce a median infrared false colour image and clip to your three regions.

Include a screen shot of the infrared false colour image for each region. (Insert figure and caption below)

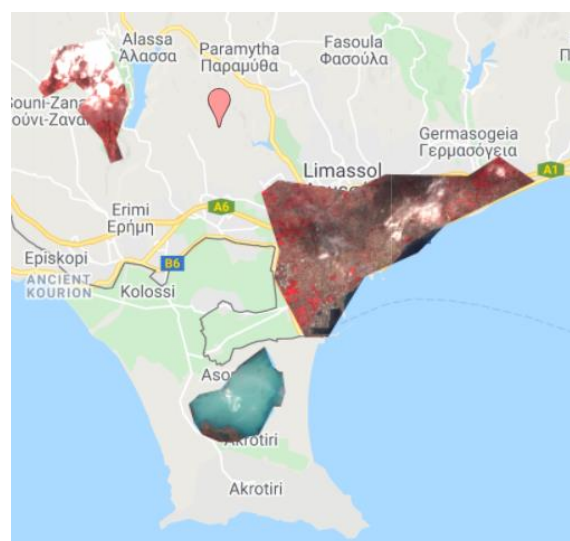


Figure 3: Median False colour images of 3 regions of interest

What bands did you use to make this image? What differences do you notice between the regions and why? (max. 200 words)

Bands Used: B5, B4, B3

Infrared false colour images use near infrared, red and green spectral bands.

False colour composite images allow vegetation to appear in different shades of red, because vegetation reflects most light in the near infrared. It is therefore evident that forest area has the brightest red colours and the highest proportion of it within the polygon. The north of the polygon appears in white, due to cloud cover, however the visible fraction of it is enough to conclude that it has most dense vegetation cover.

Cyan appearance of Akrotiri Salt Lake, relates to turbidity of the water. Suspended salt particles, restrict the transmission of light. The highest turbidity is in the centre of the lake, as it appears the lightest – highest intensity of scattered light. The shallow nature of lake and mixing with clay and silt, enhance such appearance. Limassol city appears grey/silver in the centre, revealing built environment and lack of green space. Vibrant red patches are distributed on the outskirts, suggesting dispersion of parks and green spaces. Small patches of visible sea water appear dark blue, that is the sign of clear water with minimum amount of dissolved organic and inorganic matter – high absorption and low reflectance.

Portfolio Task 1D. Produce a histogram of pixel values in the near infrared band for each habitat type.

Include a figure for each histogram plot. (Insert figures and captions below)

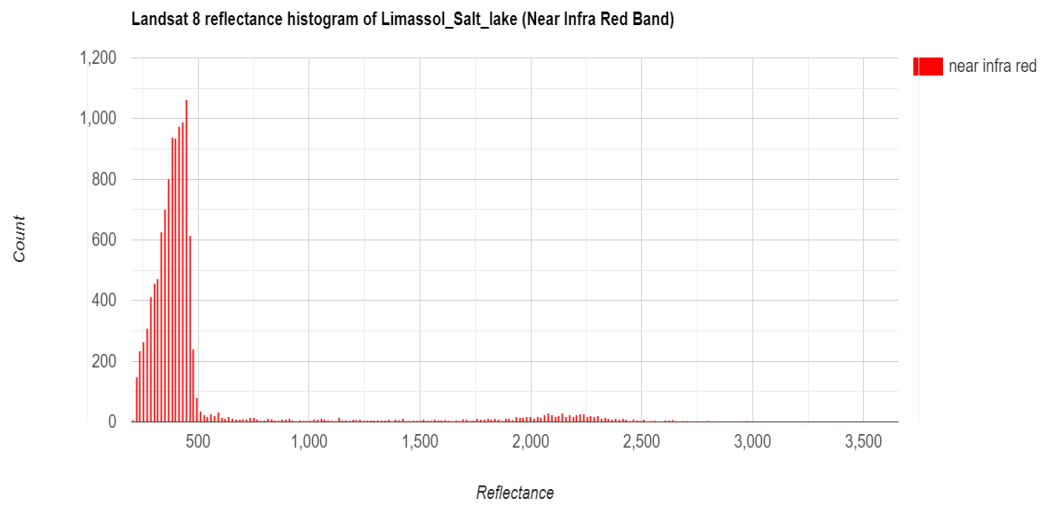


Figure 4: Histogram of Reflectance of NIR band for Limassol Salt Lake

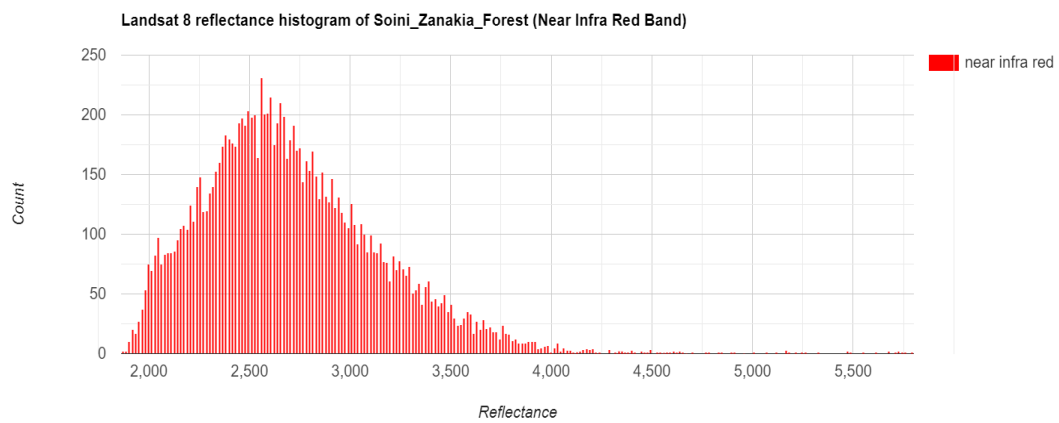


Figure 5: Histogram of Reflectance of NIR band for Soini-Zanakia Forest

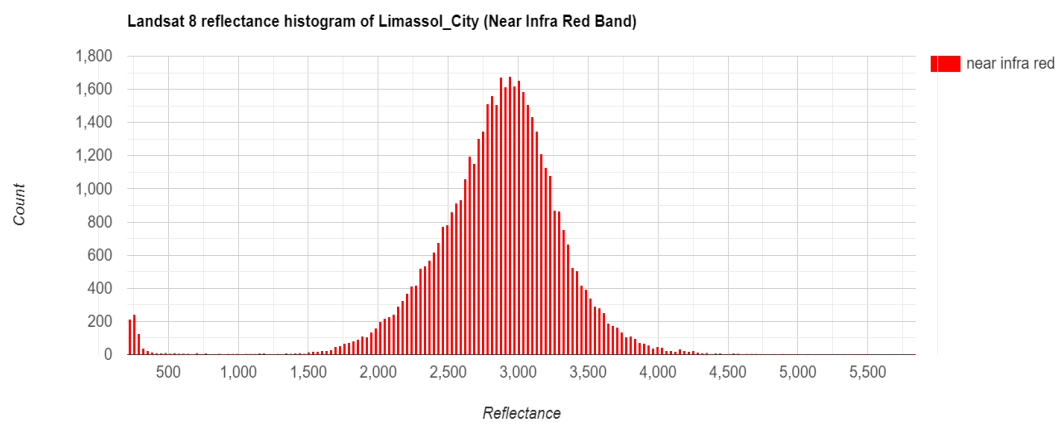


Figure 6: Histogram of Reflectance of NIR band for Limassol City

What do the histograms show about the distribution of pixel values in that band for each habitat type? (max. 200 words)

Limassol Salt Lake has the lowest reflectance of NIR light, due to the lowest proportion of vegetation in that polygon. Majority of reflectance values lie between 0 and 500, that were captured by the small surrounding area of marshland. Potentially, low values of NIR reflectance in that polygon suggest poor health state of plants. Healthy vegetation reflects very well in the wavelength range between 0.7 and 1.3 μ m. Soini-Zanakia Forest has widest shape of NIR reflectance histogram, that reveals different types of vegetation as different reflectance abilities of NIR light. Furthermore, patches of bare soil also affect the reflectance in this band. Organic matter content could be the driver of high reflectance values.

Lastly, Limassol City has narrower shape of histogram, but at higher values of reflectance. This is the result of sparse patches of greenspace, but its healthy conditions. The bright red appearance and corresponding high reflectance values reveal that while the vegetated areas are not spatially extensive, those that do exist are of very high quality.

Mark for Practical 1 Tasks ____ /10