



Applied Remote Sensing Training (ARSET) Program

Calculating Spectral Indices for Land and Aquatic Applications using QGIS

Homework Questions

Question 1

As plants interact with the visible region of the electromagnetic spectrum, which of these is better reflected?

Answers: (bold correct)

- a. Blue
- b. Green**
- c. Red
- d. IR

Feedback:

Blue and red are absorbed and IR is not within the visible region. Green reflects the most. This is why we see healthy plants as green.

Question 2

In the visible region of the electromagnetic spectrum, which of the following colors penetrates the most in the water column?

Answers: (bold correct)

- a. Blue**
- b. Green

- c. Red
- d. Orange

Feedback

Green, red and orange are heavily absorbed in the water. Blue is the region that is less absorbed in the water column, especially in the open ocean.

Question 3

NDVI is calculated using these two regions of the electromagnetic spectrum:

Answers: (bold correct)

- a. Blue and Red
- b. Green and Red
- c. Red and Near Infrared (NIR)**
- d. Blue and Green

Feedback:

The blue and green regions are not used to calculate NDVI. Only the Red and NIR. Only the Red and NIR are used to calculate NDVI. Other indices are calculated using the blue and green regions of the electromagnetic spectrum.

Question 4

Let's say you are looking at a forested region of interest and obtain an average NDVI value of 0.750. This could be interpreted as a region with:

Answers: (bold correct)

- a. Either senescence or dead plants
- b. Healthy plants**
- c. Most of its cover dominated by bare soils
- d. None of the above

Feedback:

High NDVI values are indicative of healthy vegetation. Low or negative values are indicative of either dead vegetation or areas with very low plant cover.

Question 5

Regions like the Amazon are characterized by dense vegetation. For such regions the use of ____ might be a better choice than using a more common NDVI.

Answers: (bold correct)

- a. **EVI**
- b. SAVI
- c. NDCI
- d. NBR

Feedback:

SAVI is more appropriate for low plant density regions; NDCI is used for aquatic targets; and NBR is used for assessing fire-related effects. EVI does not saturate in dense regions and therefore, it is more appropriate to use in areas like the Amazon.

Question 6

The NDCI was originally proposed to predict chlorophyll-a concentrations in _____ regions.

Answers: (bold correct)

- a. Very clear oligotrophic
- b. Inland water bodies
- c. **Turbid coastal and estuarine**
- d. Clear oceanic waters

Feedback:

The NDCI is more sensitive for turbid waters as it uses bands in the red region of the spectrum. For clear oligotrophic and/or oceanic waters it may not work well as these regions are absorbed very fast in the water column.

Question 7

You are studying shallow seagrass beds. Based on your knowledge of aquatic spectral indices, which one would you choose?

Answers: (bold correct)

- a. NDCI
- b. FAI
- c. NDTI
- d. NDAVI**

Feedback:

NDCI is used to estimate chlorophyll-a in turbid waters; FAI is used to estimate presence or absence of Sargassum in surface waters; NDTI is used to estimate turbidity in water bodies. NDAVI is best to use to estimate presence or absence of shallow seagrasses as it uses the blue and NIR regions of the spectrum.

Question 8

In QGIS, which of the following panes/windows shows a list of all data currently added to the project?

Answers: (bold correct)

- a. Processing
- b. Layers**
- c. Browser
- d. Map

Feedback:

The Layers pane shows all data sources currently added to your QGIS project. The Processing toolbox lists all available tools and models. The Browser pane shows all files on your computer and any other connected databases, not just those added to your project. The Map pane may show a subset of your data (such as a band or index) but does not comprehensively list all data associated with the project.

Question 9

In QGIS, what is the name of the tool we use to evaluate spectral indices across a scene?

Answers: (bold correct)

- a. **Raster Calculator**
- b. Raster Analysis
- c. Raster Creation
- d. Raster Tools

Feedback:

The correct tool is Raster Calculator. The other options presented are all the names of tool groups. Raster Calculator is located in the Raster Analysis tool group.