Lab.6 – Management of protected areas

1. **Plan a protected area**

Imagine you are the manager of a small fictional protected area in Northern Portugal called Serra Bonita. You need to decide how to zonate the area in order to offer strict protection to the highest number of species. Your available data are in the document ***“peneda\_data.txt”*** and they represent presence-absence data for 99 species of birds, amphibians and reptiles in grid cells of 2X2 km2. In total, the territory of the area is covered by 10 grid cells. In the data provided, the grid cells are organized per columns and the species are presented per rows.

1. Load the datataset and explain its structure
2. Calculate the species richness at site and the relative endemism at each site.
3. Assume that each grid cell has the same cost (equal to 1). What is the lowest cost at which you can protect all species? Write a function that returns the cost and verifies the optimization constraint for a given set of sites being protected (the argument of the function is a vector of x\_i). Then use that function to explore the different possibilities.
4. Discuss how the area selection could be improved. What are other criteria that could be used to zonate an area for biodiversity protection?
5. Additional task: Load the asci files as rasters in R, visualize them and calculate a raster that shows the total number of species per grid cell.