Practical Task 1.2: Using a Geographic Positioning System (GPS)

Precise geolocation is increasingly important in ecological data. Since about 2000, this has been done using a device called a GPS, which collects location data from constellations of navigation satellites.

In groups, go outdoors, turn on a GPS, and allow it to acquire satellites.

1. What is your location, in decimal degrees and in degrees minutes and seconds

~~-26.19181~~ 26.19181 °S	~~28.03172~~ 28.03172 °E
26 ° 11 '30.516 "S	28 ° 1 '54.1914 "E

2. How accurate is the estimate of your location? How could you make it more accurate?

± 5 m

3. What is your altitude? 1764 masl
4. Compare the GPS time with your wristwatch or cellphone. Which is more accurate?

The GPS time, as it includes a measure of seconds.

5. What datum is being used? WGS 84
6. Save a waypoint on the GPS. 26.19181 S 28.03172 E

7. Navigate with the GPS to -26.190134°S, 28.030103° E. Where is it? How far is it from your stored waypoint?

Where is it? Within the entrance to the circular eating area outside the restrict
How far is it in a straight line from your stored waypoint? 190 m

Practical Task 1.3 Sample design

For scientific validity, samples need to be taken in an unbiased way if they are to be considered to be statistically representative of the population. For vegetation and soil sampling, there are three broad ways of doing this. They differ in their statistical efficiency and the time it takes to implement them in the field.

1. **Randomised** Every location must have an equal probability of being sampled. This is usually done for an area by drawing two random numbers for each location and relating them to the latitudinal and longitudinal position (or some other orthogonal grid). This is a statistically robust approach, but is very tedious to implement in the field. The statistical efficiency (ie, number of samples which need to be taken to achieve a certain degree of accuracy) can be improved by first 'stratifying' the area into classes which have less internal heterogeneity than the heterogeneity of the area overall; then a random set of samples (usually proportional to the area of the class) is taken in each class.
2. **Systematic** If you can assume that the vegetation pattern is independent of a regular set of sample locations (typically a grid or line), then a systematic sample is statistically equivalent to a random sample, but is usually much easier to lay out. The assumption will be invalidated if there is a regular structure to the underlying vegetation pattern, which resonates with the