Assignment 1

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August 30, 2017

This document is Assignment 1 for ECOL8990.

Exercise 1

Using the 'Serengeti2.csv' file from this week's class, produce a dataframe that calculates median tree height across sites, and then generate a plot of median height across sites as a function of year. Include the final plot in your Markdown document.

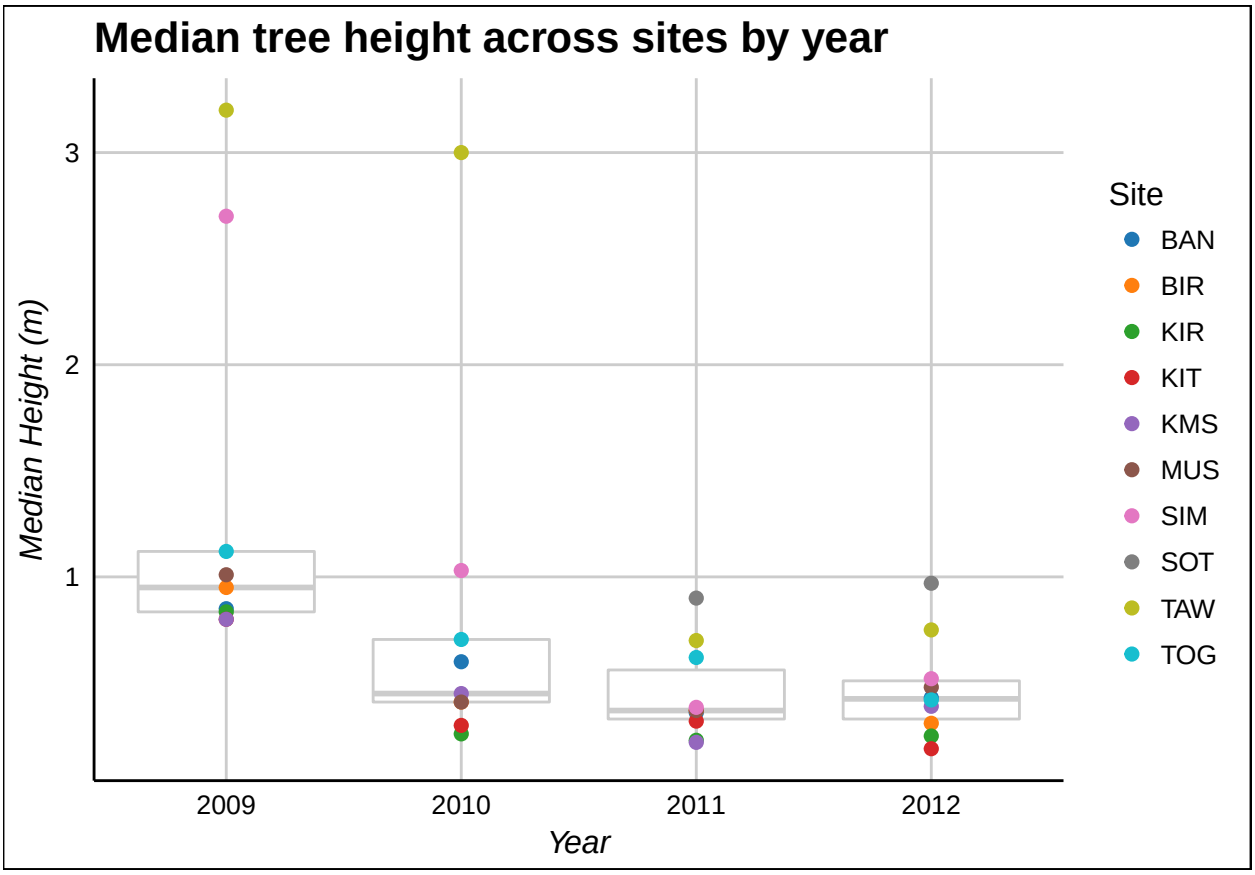


Figure 1: Plot of median tree height (m) over year. Boxplot represents distributions across sites.

Exercise 2

Write two R functions: one that can calculates the Euclidean distance between two given points with coordinates x1,y1 and x2,y2, and one that can calculate Simpson's diversity index from a vector of species abundances. Include the R code for your functions in your Markdown document, and show a worked example.

Euclidean Distance function `eucDistance`:

```
eucDistance <- function(pt1, pt2){
  #' Calculate euclidean distance between two points
  #'
  #' @param pt1 a vector of x and y coordinates for one point, ex c(1,10)
  #' @param pt2 a vector of x and y coordinates for the second point, ex c(2,5)
  #' @return the distance between the two points
  #' @examples
  #' eucDistance(pt1=c(0,0), pt2=c(5,10))
  ((pt1[1]-pt2[1])^2+(pt1[2]-pt2[2])^2)^(1/2)
}
```

```
eucDistance(pt1=c(4,-10), pt2=c(6,10))
```

```
## [1] 20.09975
```

Simpson's Diversity Index function `simpsonsDiv`. Note this is using following definition for Simpson's diversity index:

$$D = \frac{\sum_n (n(n-1))}{N(N-1)}$$

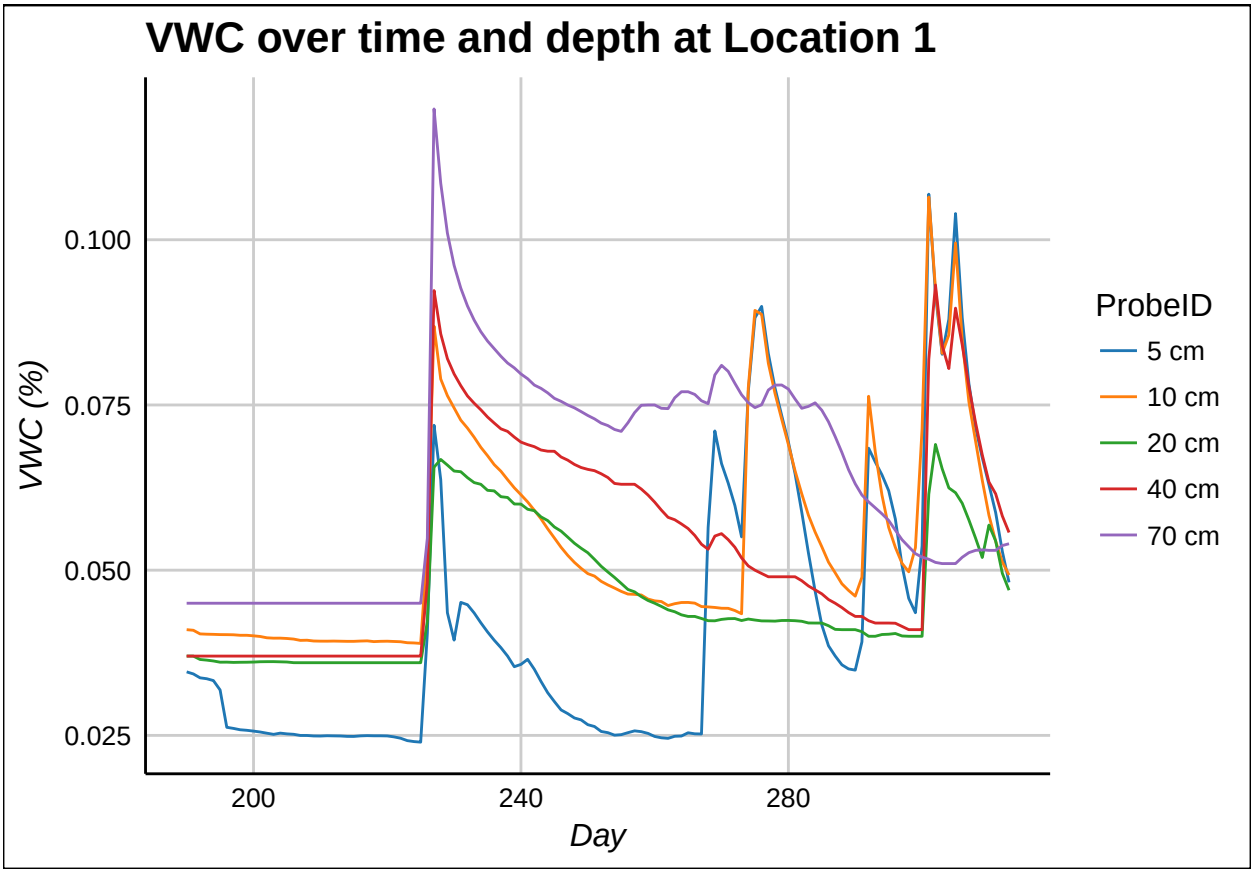
```
simpsonsDiv <- function(abundances){
  #' Calculate Simpson's Diversity Index
  #'
  #' @param abundances a vector of species abundances
  #' @return a single value of diversity
  #' @example
  #' simpsonsDiv(c(50,67,2,4,49,0,0,4,5,7))
  numerator <- sum(abundances * (abundances-1))
  denomenator <- sum(abundances) * (sum(abundances)-1)
  numerator/denomenator
}
```

```
simpsonsDiv(c(0,0,5,7,19,25,7))
```

```
## [1] 0.2677931
```

Exercise 3

Using the 'Datalogger_data.r' script from the Aug 16 class, write a script that subsets the daily soil moisture data to include only location VWC1, and produce a line plot showing daily soil moisture (VWC) as a function of time, with separate lines for each probe depth (5 to 70 cm). Include the final plot in your Markdown document.


VWC over time and depth at Location 1
0.100
0.075
0.050
0.025
VWC (%)
200
240
280
Day
ProbeID
5 cm
10 cm
20 cm
40 cm
70 cm