Programming for Reproducible Ecology in R

Location: Harvard Forest

Instructors:

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Goal: Students will learn how to use the R programming language for ecological analyses and gain experience with:

- Managing data
- Exploring data patterns
- Statistical functions
- Coding and software best practices
- Getting more help, experience and practice

Although statistics will be introduced very briefly, this will not be a statistics class.

Pre-requisites: experience with using basic computer software

Required Materials: laptop or access to some computing device

No laptop? You can borrow a Harvard Forest laptop (contact Manisha Patel)

Before Class

- Install R: http://lib.stat.cmu.edu/R/CRAN/*
- Install RStudio: https://www.rstudio.com/products/rstudio/download/
- Download the example project: https://github.com/HarvardForest/myProject/archive/master.zip

Class Schedule

First Meeting

Location: Seminar Room

June 1 8:30-10:00

- What is R?
- How to interact with R?
- What can I do in R?
- Why should I care what a function is?
- How do I manage a project in R?

Second Meeting

Location: Seminar Room

June 8 8:30-10:00

- How do I enter data into R?

- Manipulating vectors (sorting, ordering)
- Manipulating matrices (sorting, appending)
- Inputting data (read.csv,read.table)
- Why should I treat my data as *READ ONLY*?
- What is a data frame anyway?

Third Meeting

Location: Seminar Room

June 15 8:30-10:00

- What are packages? (e.g., *ggplot*)
- Overview of data visualization
- Calculating basic statistics (mean and variance)
- Writing your own functions (se: input, process, output)
- Barplot with error bars

Resources

- R Cheat Sheet – http://cran.r-project.org/doc/contrib/Short-refcard.pdf
- Software Carpentry – https://software-carpentry.org/lessons/
- Plots with ggplots – https://www.rstudio.com/wp-content/uploads/2015/03/ggplot2-cheatsheet.pdf
- Code School – http://tryr.codeschool.com
- Version Control – https://guides.github.com/activities/hello-world/ – https://help.github.com/articles/good-resources-for-learning-git-and-github
- Code for America – https://www.codeforamerica.org
- Learning Statistics – *The Ecological Detective* by Hillborn and Mangel – *Primer of Ecological Statistics* by Ellison and Gotelli