

# **Workshop SECR no Ambiente R**

## **“Modelo Espacialmente Explícito de Captura e Recaptura”**

### **Introdução (rápida) ao R**



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26/05/2014

**Período: 26 a 30/05/2014**  
**Local: Departamento de Ciências Florestais**  
**ESALQ/USP, Piracicaba**

# # Glossário (básico) do R

*script*

>getwd()

console

**argumento**

>setwd()

>list

>data.frame

função

>c

editor

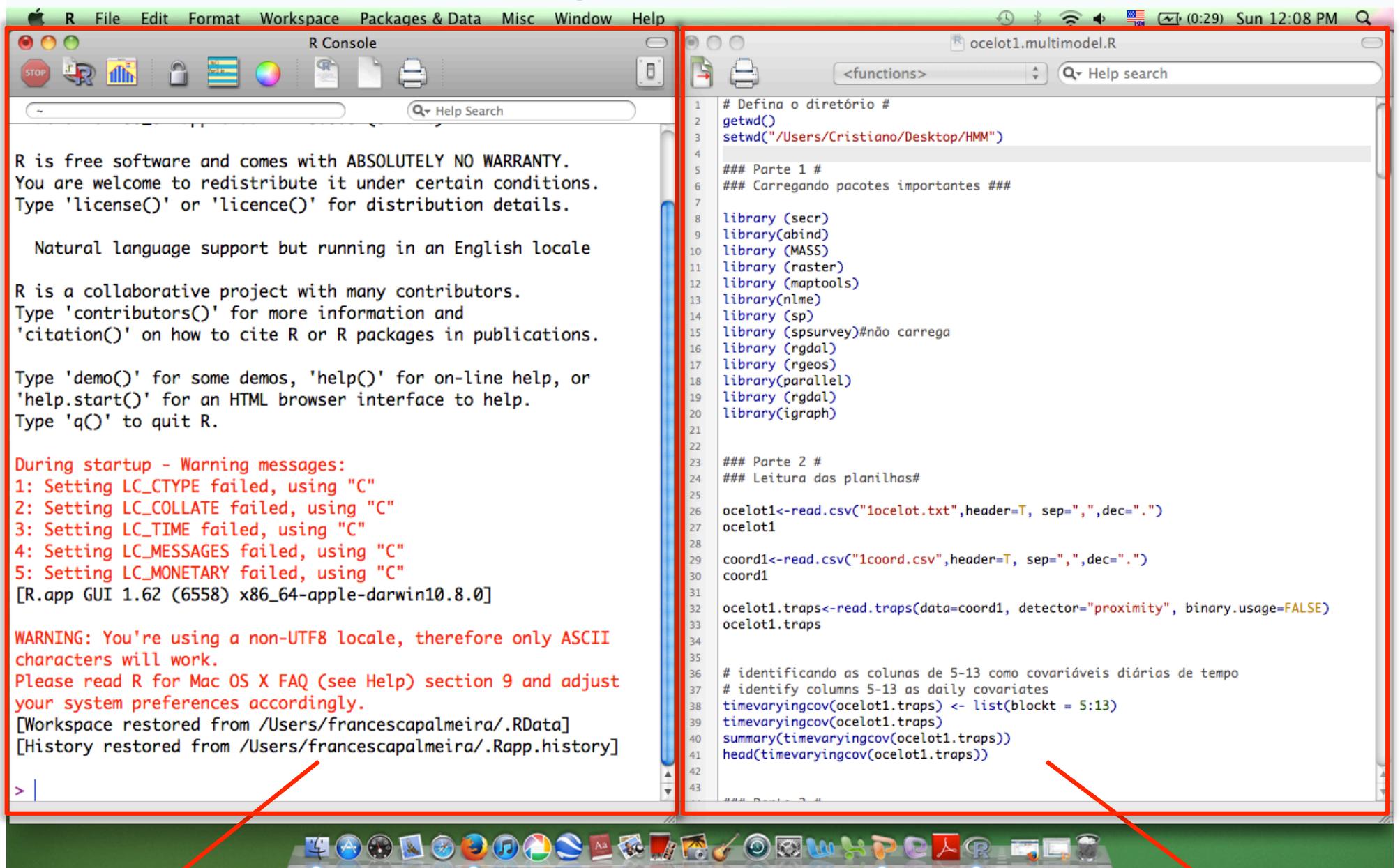
{pacote}

**objeto**

>matrix

?help

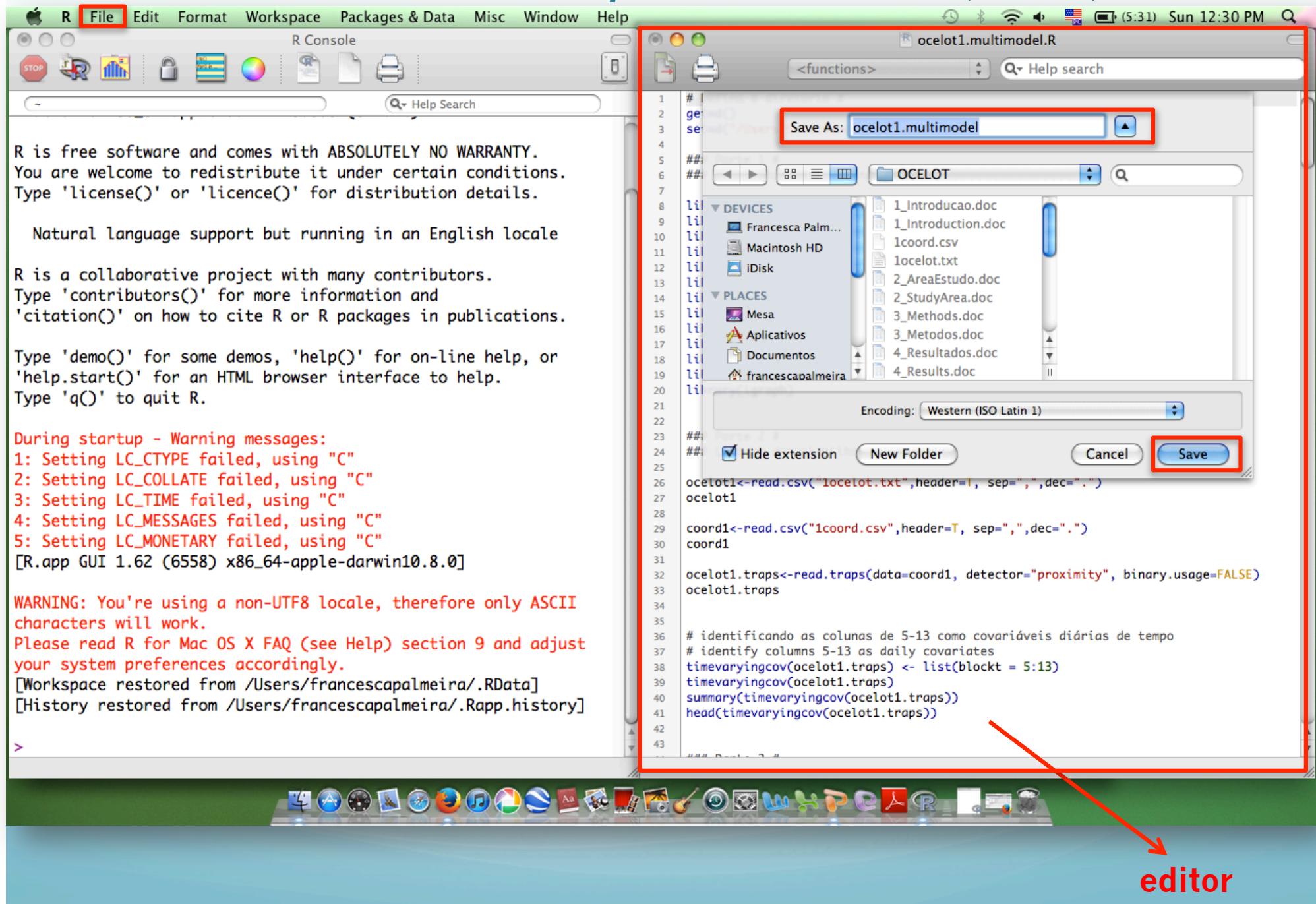
# # Layout no Mac



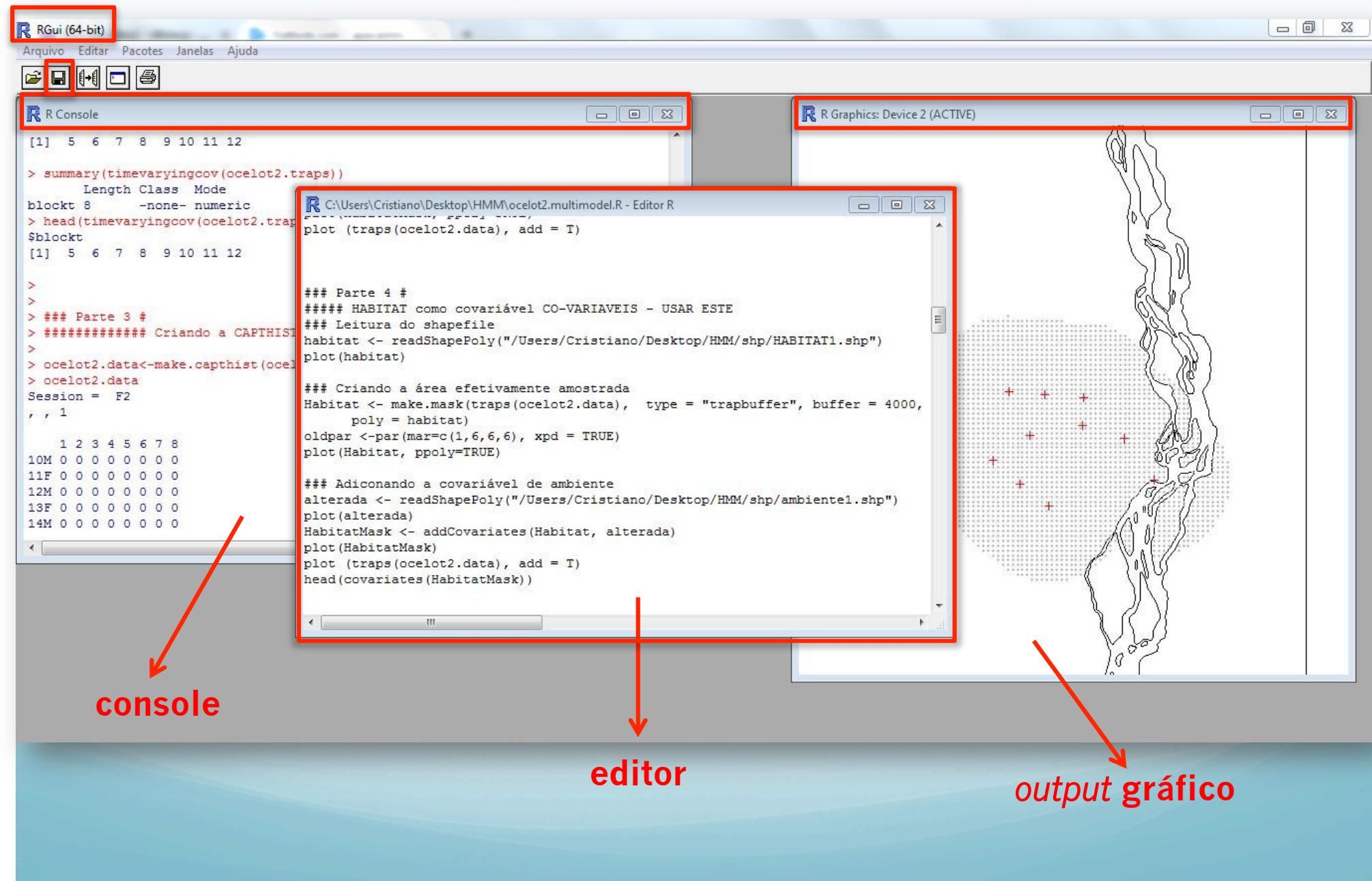
console

editor

# # Salvar o script no editor (Mac)



# # Layout no Windows



# # Código do R

The screenshot shows the R IDE interface on a Mac OS X desktop. The menu bar includes Apple, R, File, Edit, Format, Workspace, Packages & Data, Misc, Window, and Help. The title bar displays the file name "ocelot1.multimodel.R". The main window contains the R code for "ocelot1.multimodel.R". A red bracket on the right side of the code highlights the line "fit.0 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE)" and the word "predict(fit.0)". Below this highlighted area, the text "argumento da função" is written in black. A red bracket on the far right of the code highlights the entire line "predict(fit.0)". Below this second red bracket, the word "script" is written in black.

```
98 #####
99 # Parte 6 #
100 ##### MODELOS #####
101
102 ## speedy model fitting with coarse mask
103 mmask <- make.mask(traps(ocelot1.data), buffer = 3782)
104
105 ## assumindo detecção igual entre machos e fêmeas
106 ## ajustando a razão sexual p(fêmeas) = 0.5 = 5 / (5 + 5)
107 fit.0 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE)
108 predict(fit.0)
109
110 ## allowing sex-specific detection parameters
111 ## this leads to new estimate of sex ratio
112 ## permitindo detecção dos parâmetros específicos de sexo
113 fit.h2 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE,
114 model = list(g0 ~ h2, sigma ~ h2))
115 predict(fit.h2)
116
117 ## conditional likelihood (CL) fit of preceding model
118 ## estimate of sex ratio does not change
119 ## CL=FALSE, apresenta densidade (D)
120 fit.CL.h2 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE,
121 CL = FALSE, model = list(g0 ~ h2, sigma ~ h2))
122 predict(fit.CL.h2)
123
124 ## conditional likelihood fit of preceding model with timecovariates
125 ## estimate of sex ratio does not change
126 ## CL=FALSE, apresenta densidade (D)
127 ## Esforço influencia na função de detecção (g0 ~ h2 ~ blockt)
128 fit.TM.h2 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE,
129 CL = FALSE, model = list(g0 ~ h2 ~ blockt, sigma ~ h2))
130 predict(fit.TM.h2)
131
132
133 ## Esforço influencia na escala espacial da função de detecção (sigma ~ h2 ~ blockt)
134 fit.sig.h2 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE,
135 CL = FALSE, model = list(g0 ~ h2, sigma ~ h2 ~ blockt))
136 predict(fit.sig.h2)
137
138 ## Esforço influencia na função de detecção e escala espacial (g0 ~ h2 ~ blockt, sigma ~ h2 ~ blockt)
139 fit.bl.h2 <- secr.fit(ocelot1.data, hcov = "sex", timecov = "blockt", mask = mmask, trace = FALSE,
140 CL = FALSE, model = list(g0 ~ h2 ~ blockt, sigma ~ h2 ~ blockt))
```

# # Localizar e definir o diretório de trabalho

The screenshot shows the R Help window for the `getwd` function. The title bar includes the R logo, menu items (R, File, Edit, Format, Workspace, Packages & Data, Misc, Window, Help), system status (battery, signal, volume, time: 1:11, date: Sun 9:32 AM), and a search bar. The main content area has a red box around the title `getwd {base}`. Below it is the function's name **Get or Set Working Directory**. The **Description** section states that `getwd` returns an absolute filepath representing the current working directory of the R process; `setwd(dir)` is used to set the working directory to `dir`. The **Usage** section shows code examples with a red box around `getwd()` and `setwd(dir)`. The **Arguments** section describes the `dir` argument as a character string where tilde expansion will be done. The **Value** section notes that `getwd` returns a character string or `NULL` if the working directory is not available. The **Note** section cautions that the return value is an absolute filepath and may differ after changing directories. The **See Also** section lists `list.files` for directory contents and `normalizePath` for canonical path names. The **Examples** section contains R code to get the current working directory and set it if it's not null.

`getwd {base}`

**Get or Set Working Directory**

**Description**

`getwd` returns an absolute filepath representing the current working directory of the R process; `setwd(dir)` is used to set the working directory to `dir`.

**Usage**

`getwd()`  
`setwd(dir)`

**Arguments**

`dir` A character string: [tilde expansion](#) will be done.

**Value**

`getwd` returns a character string or `NULL` if the working directory is not available. On Windows the path returned will use `/` as the path separator and be encoded in UTF-8. The path will not have a trailing `/` unless it is the root directory (of a drive or share on Windows).

`setwd` returns the current directory before the change, invisibly and with the same conventions as `getwd`. It will give an error if it does not succeed (including if it is not implemented).

**Note**

Note that the return value is said to be **an** absolute filepath: there can be more than one representation of the path to a directory and on some OSes the value returned can differ after changing directories and changing back to the same directory (for example if symbolic links have been traversed).

**See Also**

[list.files](#) for the *contents* of a directory.

[normalizePath](#) for a ‘canonical’ path name.

**Examples**

```
(WD <- getwd())
if (!is.null(WD)) setwd(WD)
```

R File Edit Format Workspace Packages & Data Misc Window Help

(6:57) Sun 6:47 PM

library {base}

R Help

Help Search

library {base}

Loading and Listing of Packages

Description

library and require load add-on packages.

Usage

```
library(package, help, pos = 2, lib.loc = NULL,
       character.only = FALSE, logical.return = FALSE,
       warn.conflicts = TRUE, quietly = FALSE,
       verbose = getOption("verbose"))

require(package, lib.loc = NULL, quietly = FALSE,
       warn.conflicts = TRUE,
       character.only = FALSE)
```

Arguments

package, help the name of a package, given as a [name](#) or literal character string, or a character string, depending on whether `character.only` is `FALSE` (default) or `TRUE`.

pos the position on the search list at which to attach the loaded package. Can also be the name of a position on the current search list as given by [search\(\)](#).

lib.loc a character vector describing the location of R library trees to search through, or `NULL`. The default value of `NULL` corresponds to all libraries currently known to [.libPaths\(\)](#). Non-existent library trees are silently ignored.

character.only a logical indicating whether `package` or `help` can be assumed to be character strings.

logical.return logical. If it is `TRUE`, `FALSE` or `TRUE` is returned to indicate success.

warn.conflicts logical. If `TRUE`, warnings are printed about [conflicts](#) from attaching the new package. A conflict is a function masking a function, or a non-function masking a non-function.

verbose a logical. If `TRUE`, additional diagnostics are printed.

quietly a logical. If `TRUE`, no message confirming package loading is printed, and most often, no errors/warnings are printed if package loading fails.

Details

`library(package)` and `require(package)` both load the package with name `package` and put it on the search list. `require` is designed for use inside other functions; it returns `FALSE` and gives a warning (rather than an error as `library()` does by default) if the package does not exist. Both functions check and update the list of currently loaded packages and do not reload a package which is already loaded. (If you want to reload such a package, call [detach\(unload = TRUE\)](#) or [unloadNamespace](#) first.) If you want to load a package without putting it on the search list, use [requireNamespace](#).



R File Edit Format Workspace Packages & Data Misc Quartz Window Help

(Carregado) Sat 1:47 PM

R Help

matrix {base}

matrix

R Documentation

**Matrices**

**Description**

matrix creates a matrix from the given set of values.

as.matrix attempts to turn its argument into a matrix.

is.matrix tests if its argument is a (strict) matrix.

**Usage**

```
matrix(data = NA, nrow = 1, ncol = 1, byrow = FALSE,
       dimnames = NULL)

as.matrix(x, ...)
## S3 method for class 'data.frame'
as.matrix(x, rownames.force = NA, ...)

is.matrix(x)
```

**Arguments**

**data** an optional data vector (including a list or [expression](#) vector). Non-atomic classed R objects are coerced by [as.vector](#) and all attributes discarded.

**nrow** the desired number of rows.

**ncol** the desired number of columns.

**byrow** logical. If FALSE (the default) the matrix is filled by columns, otherwise the matrix is filled by rows.

**dimnames** A [dimnames](#) attribute for the matrix: NULL or a list of length 2 giving the row and column names respectively. An empty list is treated as NULL, and a list of length one as row names. The list can be named, and the list names will be used as names for the dimensions.

**x** an R object.

**...** additional arguments to be passed to or from methods.

**rownames.force** logical indicating if the resulting matrix should have character (rather than NULL) [rownames](#). The default, NA, uses NULL rownames if the data frame has 'automatic' row.names or for a zero-row data frame.

**Details**



R File Edit Format Workspace Packages & Data Misc Quartz Window Help

(Carregado) Sat 1:48 PM

R Help

list {base}

R Documentation

list(...)  
pairlist(...)

as.list(x, ...)  
## S3 method for class 'environment'  
as.list(x, all.names = FALSE, ...)  
as.pairlist(x)

is.list(x)  
is.pairlist(x)

alist(...)

Arguments

... objects, possibly named.  
x object to be coerced or tested.  
all.names a logical indicating whether to copy all values or (default) only those whose names do not begin with a dot.

Details

Almost all lists in R internally are *Generic Vectors*, whereas traditional *dotted pair* lists (as in LISP) remain available but rarely seen by users (except as [formals](#) of functions).

The arguments to `list` or `pairlist` are of the form `value OR tag = value`. The functions return a list or dotted pair list composed of its arguments with each value either tagged or untagged, depending on how the argument was specified.

`alist` handles its arguments as if they described function arguments. So the values are not evaluated, and tagged arguments with no value are allowed whereas `list` simply ignores them. `alist` is most often used in conjunction with [formals](#).



R File Edit Format Workspace Packages & Data Misc Quartz Window Help

(Carregado) Sat 1:46 PM

R Help

Print

data.frame {base}

R Documentation

data.frame {base} Data Frames

Description

This function creates data frames, tightly coupled collections of variables which share many of the properties of matrices and of lists, used as the fundamental data structure by most of R's modeling software.

Usage

```
data.frame(..., row.names = NULL, check.rows = FALSE,
           check.names = TRUE,
           stringsAsFactors = default.stringsAsFactors())
```

default.stringsAsFactors()

Arguments

... these arguments are of either the form `value` or `tag = value`. Component names are created based on the tag (if present) or the deparsed argument itself.

`row.names` NULL or a single integer or character string specifying a column to be used as row names, or a character or integer vector giving the row names for the data frame.

`check.rows` if `TRUE` then the rows are checked for consistency of length and names.

`check.names` logical. If `TRUE` then the names of the variables in the data frame are checked to ensure that they are syntactically valid variable names and are not duplicated. If necessary they are adjusted (by `make.names`) so that they are.

`stringsAsFactors` logical: should character vectors be converted to factors? The 'factory-fresh' default is `TRUE`, but this can be changed by setting `options(stringsAsFactors = FALSE)`.

Details

A data frame is a list of variables of the same number of rows with unique row names, given class "data.frame". If no variables are included, the row names determine the number of rows.

The column names should be non-empty, and attempts to use empty names will have unsupported results. Duplicate column names are allowed, but you need to use `check.names = FALSE` for `data.frame` to generate such a data frame. However, not all operations on data frames will preserve duplicated column names: for example matrix-like subsetting will force column names in the result to be unique.

`data.frame` converts each of its arguments to a data frame by calling `as.data.frame(optional = TRUE)`. As that is a generic function, methods can be written to change the behaviour of arguments according to their classes: R comes with many such methods. Character variables passed to `data.frame` are converted to factor columns unless protected by `l` or argument `stringsAsFactors` is false. If a list or data frame or matrix is passed to `data.frame` it is as if each component or column had been passed as a separate argument (except for matrices of class "array" and those protected by `l`).



# # Concatenar para formar vetores

The screenshot shows the R Help window with the following details:

- Title Bar:** R Help
- Search Bar:** Search term: c
- Section:** R Documentation
- Function Name:** `c {base}` (highlighted with a red box)
- Description:** Combine Values into a Vector or List
- Usage:** `c(..., recursive = FALSE)` (highlighted with a red box)
- Arguments:**
  - ... objects to be concatenated.
  - recursive logical. If `recursive = TRUE`, the function recursively descends through lists (and pairlists) combining all their elements into a vector.
- Details:** The output type is determined from the highest type of the components in the hierarchy NULL < raw < logical < integer < double < complex < character < list < expression. Pairlists are treated as lists, but non-vector components (such names and calls) are treated as one-element lists which cannot be unlisted even if `recursive = TRUE`.

`c` is sometimes used for its side effect of removing attributes except names, for example to turn an array into a vector. `as.vector` is a more intuitive way to do this, but also drops names. Note too that methods other than the default are not required to do this (and they will almost certainly preserve a class attribute).
- Value:** NULL or an expression or a vector of an appropriate mode. (With no arguments the value is NULL.)
- S4 methods:** This function is S4 generic, but with argument list (`x, ..., recursive = FALSE`).
- References:**

# # Como citar o R em publicações?

```
R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.
```

A BibTeX entry for LaTeX users is

```
@Manual{,
  title = {R: A Language and Environment for Statistical Computing},
  author = {{R Core Team}},
  organization = {R Foundation for Statistical Computing},
  address = {Vienna, Austria},
  year = {2013},
  url = {http://www.R-project.org/},
}
```

We have invested a lot of time and effort in creating R, please cite it when using it for data analysis. See also 'citation("pkgnane")' for citing R packages.

> |

# Resumo dos procedimentos gráficos no R

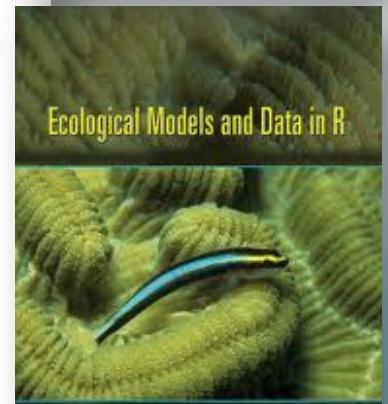
Predictors	Response	Plot choices
single categorical	single categorical	table, barplot , dotchart, barchart [L], dotplot [L]
multiple categorical	single categorical	as above, plus mosaicplot, small multiples (par(mfrow)/par(mfcol) or lattice plots), sizeplot [plotrix] or 3D histogram [scatterplot3d, rgl]
circular	categorical	rose.diag [CircStats]
circular	continuous	polar.plot [plotrix]
none	compositional	barplot(...,beside=FALSE), barchart(...,stack=TRUE) [L], ternaryplot [vcd], triax.plot [plotrix]
single categorical	multiple continuous	stars
none or single categorical	single continuous	boxplot, bwplot [L], violin plots (bwplot(...,panel=panel.violin) [L], vioplot [vioplot], stripplot [L], barplot2 [gplot] for error bars
continuous+categorical	single continuous	scatterplot (plot , xyplot [L]) with categories indicated by plotting symbols (pch), color (col), size (cex) or (in lattice) groups argument
single continuous	single continuous	plot , xyplot [L]; lowess, supsmu, smooth.spline for curves; plotCI [gplots or plotrix] for error bars
multiple continuous	multiple continuous	conditioning plots (coplot or lattice plots), 3D scatter- or lollipop plots (cloud [L], scatterplot3d [scatterplot3d] or plot3d [rgl]
continuous (time or 1D space)	continuous	plot/xyplot with type="l" or type="b"
continuous (2D space)	continuous	image, contour, persp, kde2d [MASS], wireframe [L], surface3d [rgl], maps package, maptools package, sp package

Table 2.1 Summary of graphical procedures. Square brackets denote functions in packages; [L] denotes functions in the `lattice` package.

<<http://ms.mcmaster.ca/~bolker/>>



Inspiring Innovation and Discovery



Benjamin M. Bolker

# Wiki com updates e erratas

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Ecological Models and Data in R

Ecological Models and Data in R  
Benjamin M. Bolker

- [miscellaneous thoughts](#) (a pseudo-blog/catch-all space)
- [errata](#) (not too many I hope)
- answers to [frequently asked questions](#)
- clarifications or extensions of discussions in the book, etc.. I am starting out by posting (in the [chapters](#) section) (1) notes that I took as I went through the proofs about things I wished I'd said but didn't have room for or couldn't change (2) points that people have made in e-mail since then.
- [Courses](#) around the world offered on these topics
- [Worked examples](#) of various sorts
- [To do list](#): things I intend to get around to
- EMD in R in the [Princeton University Press catalog](#)
- EMD in R on [amazon.com](#)
- [Reviews](#)<sup>1</sup>
  - Robert Gramacy in *The American Statistician*, August 2009, Vol. 63, No. 3 281 doi:10.1198/tast.2009.br633 ([PDF](#))
  - Rachel Fewster in *Biometrics* 65, 660–673 June 2009 doi:10.1111/j.1541-0420.2009.01247\_11.x ([PDF](#))
  - Daniel Bunker in *Ecology*, 90(8), 2009, pp. 2333–2334 ([PDF](#))
  - Carsten Dormann in *Basic and Applied Ecology* 10 (2009) 487, doi:10.1016/j.baae.2009.01.001 ([PDF](#))
  - Matthew Aiello-Lammens in *Quarterly Review of Biology*, 84, 288 (2009), doi:10.1086/644667 ([PDF](#))
  - Pavle Mladenović in [MathSciNet reviews](#)
  - B. Hanowell's [Evolutionary Modeling Survival Kit](#) blog entry says:

new page

<<http://emdbolker.wikidot.com/>>

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# Sistema Administrativo da Pós-Graduação

## Catálogo de disciplinas

**Disciplina LCF5876**  
**Computação no Ambiente R: Aplicações em Ecologia e Recursos Florestais**

**Área de Concentração:** 11150

**Criação:** 09/11/2009

**Ativação:** 09/11/2009

**Nr. de Créditos:** 4

**Carga Horária:**

Teórica (por semana)	Prática (por semana)	Estudos (por semana)	Duração	Total
8	0	22	2 semanas	60 horas

**Docente Responsável:**  
João Luis Ferreira Batista

**Objetivos:**  
Desenvolver proficiência em computação no ambiente R para a implementação de métodos quantitativos na pesquisa em Ecologia e Recursos Florestais.

**Justificativa:**  
A abordagem quantitativa é um elemento fundamental da pesquisa científica contemporânea. A utilização de métodos quantitativos é quase uma obrigatoriedade na pesquisa em Ecologia e Recursos Florestais, ainda que o foco da pesquisa não seja necessariamente quantitativo. Assim, a formação de pesquisadores exige o desenvolvimento de proficiência numa ferramenta adequada para implementação dos métodos quantitativos. O ambiente computacional R é um excelente sistema computacional para implementação dos diversos métodos quantitativos: métodos numéricos e gráficos de análise de dados e métodos de simulação. Possui ainda as



# Wiki da disciplina LCF-5876 na ESALQ/USP

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(Carregado) Sat 12:49 PM

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Aplicações em Ecologia e Recursos Florestais

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LCF-5876 Computação no Ambiente R:  
Aplicações em Ecologia  
e Recursos Florestais

Programa

A disciplina *LCF-5876 Computação no Ambiente R: Aplicações em Ecologia e Recursos Florestais* faz parte do Programa de Pós-Graduação em Recursos Florestais do Departamento de Ciências Florestais, da Escola Superior de Agricultura "Luiz de Queiroz", da Universidade de São Paulo, campus de Piracicaba.

Objetivos

O objetivo da disciplina é desenvolver proficiência em computação no ambiente R para a implementação de métodos quantitativos na pesquisa e desenvolvimento tecnológico em Ecologia e Recursos Florestais.

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- Apresentação

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- Orientadores

• Egressos USP

**Catálogo de disciplinas**

**Disciplina BIE5782-5**  
**Uso da Linguagem R para Análise de Dados em Ecologia**

**Área de Concentração:** 41134

**Criação:** 14/12/2009

**Ativação:** 14/12/2009

**Nr. de Créditos:** 4

**Carga Horária:**

Teórica (por semana)	Prática (por semana)	Estudos (por semana)	Duração	Total
12	0	8	3 semanas	60 horas

**Docentes Responsáveis:**

Alexandre Adalardo de Oliveira

Paulo Inácio de Knegt López de Prado

**Objetivos:**

1. Demonstrar o potencial de uso da linguagem R (R Development Core Team, 2008) para análises estatísticas em projetos de pesquisa em ecologia. 2. Propiciar aos alunos o entendimento do funcionamento do ambiente de trabalho do R e de sua filosofia de análise de dados. 3. Tornar os alunos proficientes em algumas ferramentas básicas de análise estatístico com a linguagem R.

**Justificativa:**

A abordagem quantitativa é um elemento fundamental da pesquisa científica contemporânea. A utilização de análises estatísticas de dados se tornou quase um obrigatoriedade na pesquisa em Ecologia, mesmo quando o

Wiki da disciplina BIE5782-5 no IB/USP

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(Carregado) Sat 12:31 PM

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ecologia.ib.usp.br/bie5782/doku.php?id=bie5782:dezmanda

a Análise de Dados em Ecologia

Entrar

Alterações recentes Gerenciador de mídias Índice

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**Índice**



**Curso 2014**

- Introdução
- Curso IBUSP 2014
- Atividades Preparatórias
- Os 10 Mandamentos do R

**Material de Apoio**

- Apostila on line
- Slide das Aulas
- Códigos de Aula
- Tutoriais
- Exercícios
- Soluções dos Exercícios
- Arquivos de Dados
- Outros

**Área dos Alunos**

- Wiki Alunos
- Trabalho Final
- Postar Exercícios

**Os 10 Mandamentos do R**



- 1º - Utilizarás o R para tuas análises bem como para a manipulação de teus dados(não mais o Excel);
- 2º - Nunca digitarás o código no console;
- 3º - Salvarás seus scripts e não se preocuparás com o .RData;
- 4º - Sempre concatenarás;
- 5º - Jamais esquecerás dos parênteses das funções;
- 6º - Conferirás o diretório de trabalho e os dados após a importação, antes de enlouqueceres;
- 7º - Usarás o help antes de perguntares e não culparás o R por teus erros;
- 8º - Não esmorecerás após as primeiras noites em claRo e jamais amaldiçoarás o R por tuas faltas de vírgulas;
- 9º - Lembrarás das aspas dos caracteres;
- 10º - Não cobiçarás e aperfeiçoarás os códigos alheios e nunca ocultarás o código e a autoria original;

— [Alexandre Adalardo de Oliveira](#) 2014/03/20 11:17



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