Datos espaciales y mapeo en R.

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```
#Establecer directorio
setwd("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R SISTES")

#Paquetes
library(ggplot2)  # ggplot() fortify()
library(dplyr)  # %>% select() filter() bind_rows()

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

library(rgdal)  # readOGR() spTransform()

## Loading required package: sp

## rgdal: version: 1.4-8, (SVN revision 845)
##  Geospatial Data Abstraction Library extensions to R successfully
loaded
##  Loaded GDAL runtime: GDAL 2.2.3, released 2017/11/20
##  Path to GDAL shared files: C:/Users/ldani/OneDrive/Documentos/R/win-
library/3.6/rgdal/gdal
##  GDAL binary built with GEOS: TRUE
##  Loaded PROJ.4 runtime: Rel. 4.9.3, 15 August 2016, [PJ_VERSION: 493]
##  Path to PROJ.4 shared files:
C:/Users/ldani/OneDrive/Documentos/R/win-library/3.6/rgdal/proj
##  Linking to sp version: 1.3-2

library(raster)  # intersect()

##
## Attaching package: 'raster'

## The following object is masked from 'package:dplyr':
##
##     select

library(ggsn)  # north2() scalebar()
```

```
## Loading required package: grid

##
## Attaching package: 'ggsn'

## The following object is masked from 'package:raster':
##
##     scalebar

library(rworldmap)  # getMap()

## ### Welcome to rworldmap ###

## For a short introduction type :   vignette('rworldmap')

#Datos por especie
Fpendul <- read.csv("F.pendul.csv", sep = ",",row.names = NULL)
Pcarinat <- read.csv("P.carinat.csv", sep = ",")
Pfelic <- read.csv("P.felic.csv", sep = ",")
vars <- c("scientificName", "decimalLongitude",
          "decimalLatitude")
Pcarinat_trim <- Pcarinat %>% dplyr::select(one_of(vars))
Pfelic_trim <- Pfelic %>% dplyr::select(one_of(vars))
Fpendul_trim <- Fpendul %>% dplyr::select(one_of(vars))

#Archivos shape por países.
Bra_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R
SISTES/BRA_adm1.shp")
Bol_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R
SISTES/BOL_adm1.shp")


#Mapa con archivos shape y ocurrencia de especies.
(sp_map <- ggplot() +
    geom_polygon(data = Bra_shp,
                 aes(x = long, y = lat, group = group),
                 fill = NA, colour = "black") +
    geom_polygon(data = Bol_shp,
                     aes(x = long, y = lat, group = group),
                     fill = NA, colour = "black") +
    geom_point(colour = "blue", alpha = 0.5,
               aes(x = decimalLongitude, y = decimalLatitude),
               data = Fpendul_trim) +
    geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Pcarinat_trim) +
    theme_bw() +
    xlab("Longitude") +
    ylab("Latitude") +
    coord_quickmap())
```

```
## Regions defined for each Polygons

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## Warning: Removed 1 rows containing missing values (geom_point).
```

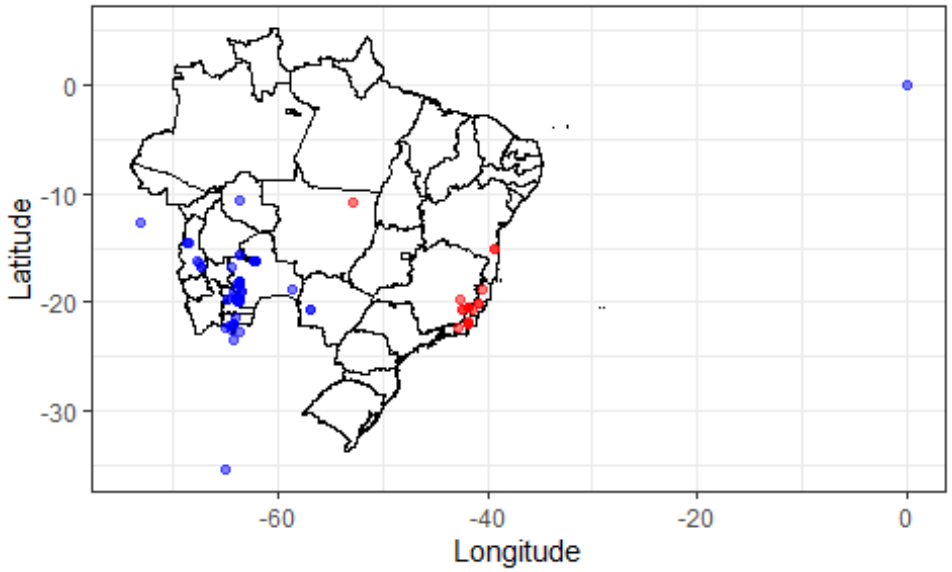


```
#Mapa generado en R con ocurrencia de especies.
world <- getMap(resolution = "low")
saf_countries <- c("Brazil","Bolivia")
world_saf <- world[world@data$ADMIN %in% saf_countries, ]
(sp_map <- ggplot() +
        geom_polygon(data = world_saf,
                     aes(x = long, y = lat, group = group),
                     fill = NA, colour = "black") +
        geom_point(colour = "blue", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Fpendul_trim) +
        geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Pcarinat_trim) +
        theme_bw() +
        xlab("Longitude") +
        ylab("Latitude") +
        coord_quickmap())

## Regions defined for each Polygons

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```
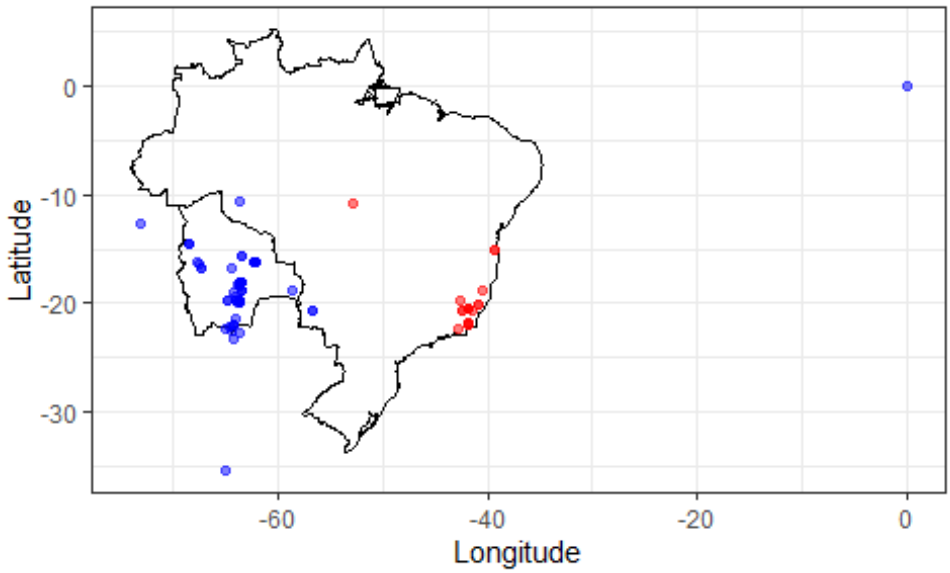
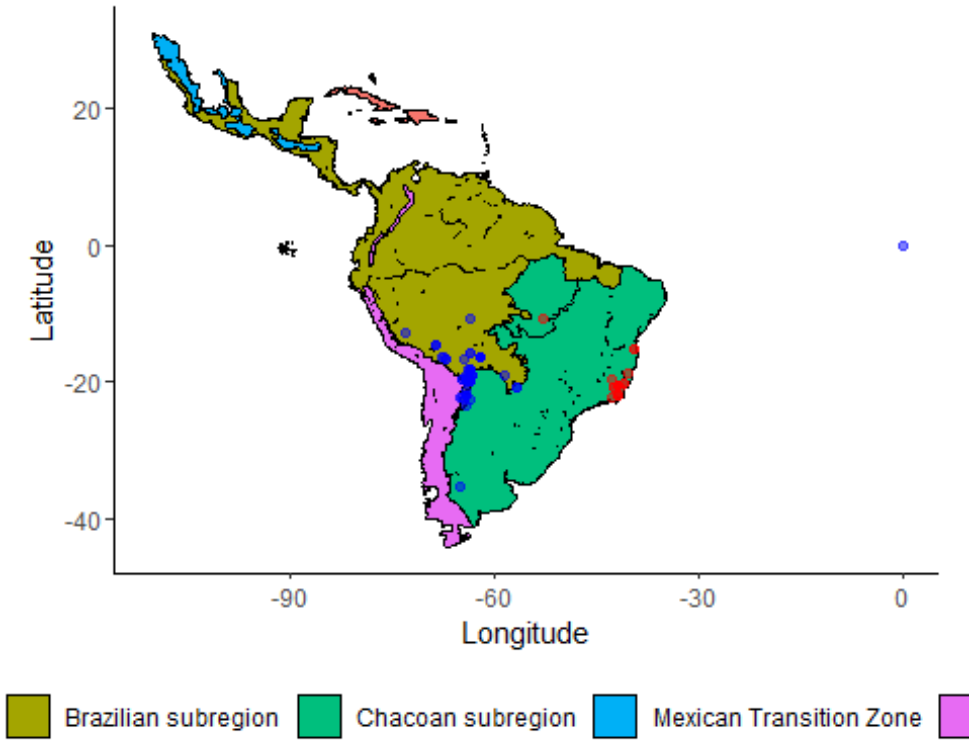




```
#Mapa a partir de archivo shape con ecoregiones de Morroney ocurrencia de
especies.
Morrone_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA
_ R SISTES/Lowenberg_Neto_2014.shp")
Morrone <- fortify(Morrone_shp, region = "Subregio_1")
(map_Morrone <- ggplot() +
        geom_polygon(data = Morrone,
                     aes(x = long, y = lat, group = group, fill = id),
                     color = "black", size = 0.5) +
        geom_point(colour = "blue", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Fpendul_trim) +
        geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Pcarinat_trim) +
        theme_classic() +
        theme(legend.position="bottom") +
        theme(legend.title=element_blank()) +
        xlab("Longitude") +
        ylab("Latitude") +
        coord_quickmap())

## Warning: Removed 1 rows containing missing values (geom_point).
```


20
0
-20
-40
Latitude
-90
-60
-30
0
Longitude
Brazilian subregion
Chacoan subregion
Mexican Transition Zone