Week 6

Hilary Dugan

3/13/2018

NLCD CODE

```
library(sp)
library(raster)
library(rgdal)
library(rgeos)

counties = readOGR('../Lecture6_Overlays/Data/County_Boundaries_24K/County_Boundaries_24K.shp',
                   layer='County_Boundaries_24K',stringsAsFactors = F)
nlcd = raster('C:/Users/hdugan/Documents/NLCD/nlcd_2011_landcover_2011_edition_2014_10_10/nlcd_2011_lanc
state = readOGR('C:/Users/hdugan/Dropbox/RandomR/GIS_Wisconsin/StateOutline/WI_state_outline.shp',layer=

# Crop nlcd to state of Wisconsin
state = spTransform(state,crs(nlcd))
nlcdWI = crop(nlcd,state)

nhd = readOGR('O:/DuganData/NHD2017/NHD_H_Wisconsin_Shape/Shape/NHDWaterbody.shp',layer='NHDWaterbody')
nhd.proj = spTransform(nhd,crs(nlcd))

################### NLCD ############################
# You need the packages in the function
getWater <- function(countyID,counties,nlcd) {
  library(sp)
  library(raster)
  library(rgdal)
  library(rgeos)
  library(dplyr)
  county <- subset(counties,counties$OBJECTID==countyID)
  county <-  spTransform(county,crs(nlcd))
  county_nlcd <- crop(nlcd,county)

  a <- extract(county_nlcd,county)
  percent_water = round(100*length(a[[1]][a[[1]]==11])/length(a[[1]]),3)
  return(percent_water)
}
```

Test function

```
getWater("54",counties,nlcdWI) # Test to make sure function works
```

Run in parallel

```r
# Create vector that will be used in the apply parallel call
c = counties$OBJECTID

#### RUN IN PARALLEL ####
library(parallel)
# Calculate the number of cores
no_cores <- detectCores() - 1
# Initiate cluster
cl <- makeCluster(no_cores)
# Call function, just testing first 7 counties
output = parLapply(cl, c, getWater, counties = counties, nlcd = nlcdWI)
# Stop cluster
stopCluster(cl)

# Write output
pw = data.frame(counties = counties$COUNTY_NAM, perWater = unlist(output))
write.csv(pw,'WIwater_NLCD.csv',row.names = F)
```

NHD CODE

```r
################### NHD ############################
# You need the packages in the function
getWaterNHD <- function(countyID,counties,nlcd) {
  library(sp)
  library(raster)
  library(rgdal)
  library(rgeos)
  library(dplyr)
  county <- subset(counties,counties$OBJECTID==countyID)
  # Transform to NLCD CRS
  county <-  spTransform(county,crs(nlcd))
  county_nhd <- crop(nhd.proj,county)

  area_county = gArea(county)
  area_nhd = gArea(county_nhd)

  percent_water = round(100*area_nhd/area_county,3)
  return(percent_water)
}

getWaterNHD("2",counties,nlcdWI) # Test to make sure function works

# Create vector that will be used in the apply parallel call
c = counties$OBJECTID

#### RUN IN PARALLEL ####
library(parallel)
# Calculate the number of cores
no_cores <- detectCores() - 1
# Initiate cluster
cl <- makeCluster(no_cores)
# Call function, just testing first 7 counties
```

```
output = parLapply(cl, c, getWaterNHD, counties = counties, nlcd = nlcdWI)
# Stop cluster
stopCluster(cl)

# Write output
pw = data.frame(counties = counties$COUNTY_NAM, perWater = unlist(output))
write.csv(pw,'WIwater_NLCD.csv',row.names = F)
```

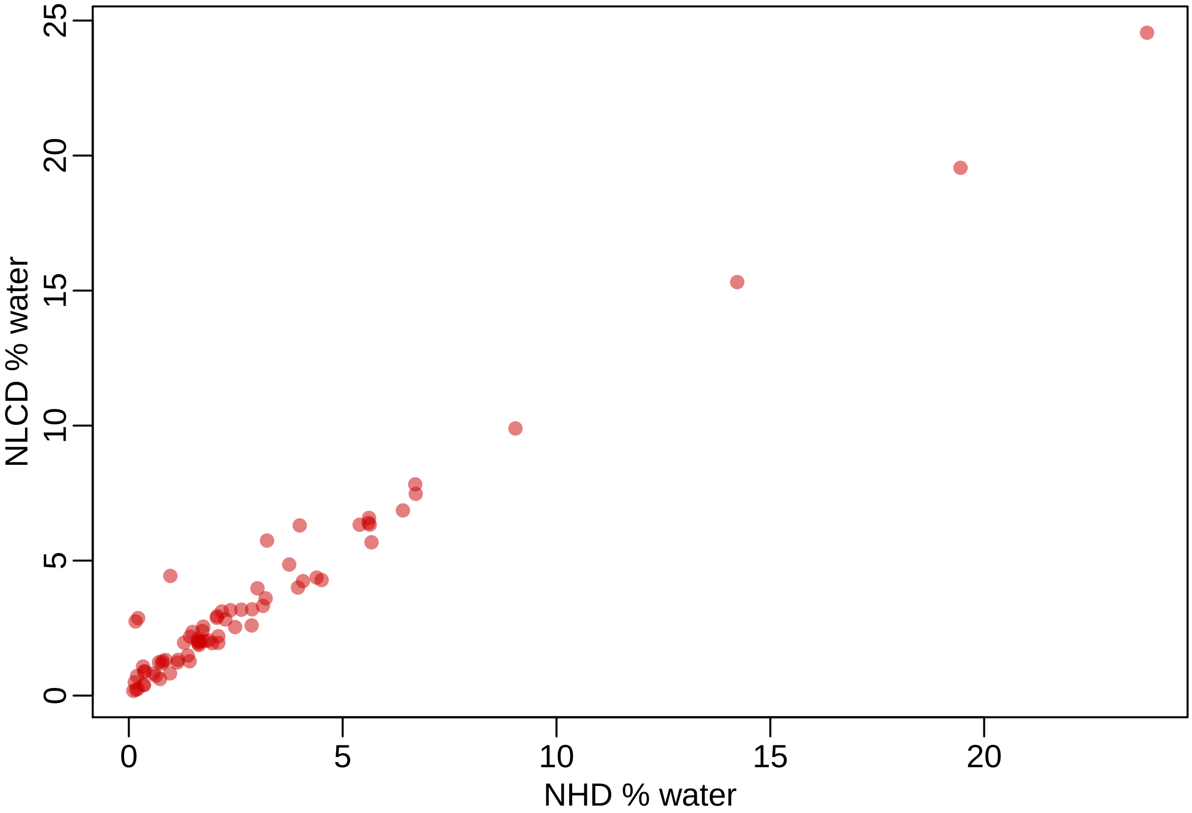
```
a = read.csv('Week6_WIwater_NHD.csv',stringsAsFactors = F)
b = read.csv('Week6_WIwater_NLCD.csv',stringsAsFactors = F)

par(mar=c(3,3,1,1),mgp=c(1.5,0.5,0))
plot(a$perWater,b$perWater,xlab = 'NHD % water',ylab='NLCD % water',pch=16,col=adjustcolor('red3',0.5))

#### Counties data ####
library(rgdal)
```

```
## Loading required package: sp
```

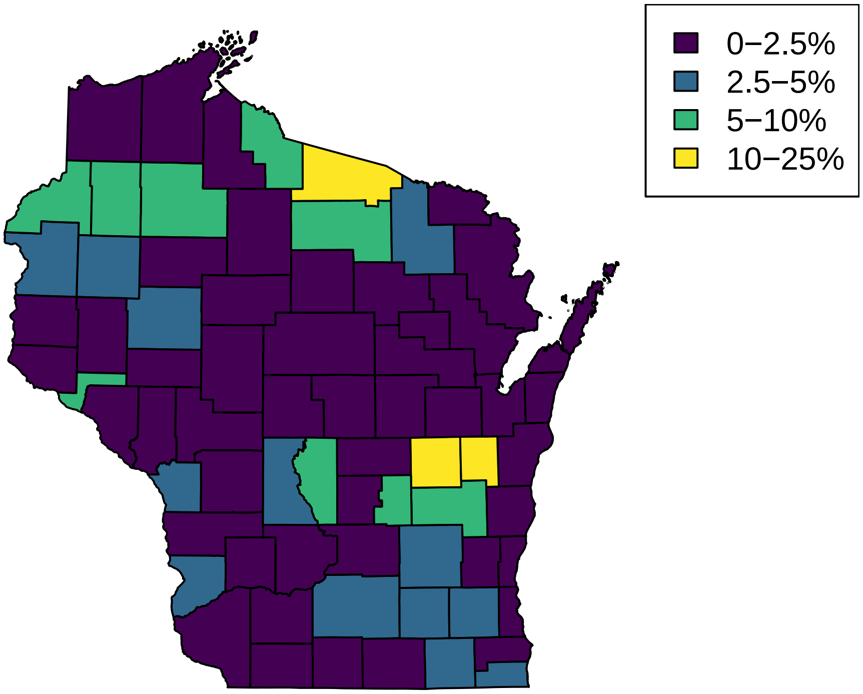
```
## rgdal: version: 1.2-16, (SVN revision 701)
##  Geospatial Data Abstraction Library extensions to R successfully loaded
##  Loaded GDAL runtime: GDAL 2.1.3, released 2017/20/01
##  Path to GDAL shared files: /Library/Frameworks/R.framework/Versions/3.4/Resources/library/rgdal/gdal
##  GDAL binary built with GEOS: FALSE
##  Loaded PROJ.4 runtime: Rel. 4.9.3, 15 August 2016, [PJ_VERSION: 493]
##  Path to PROJ.4 shared files: /Library/Frameworks/R.framework/Versions/3.4/Resources/library/rgdal/p
##  Linking to sp version: 1.2-5
```



```
library(viridisLite)
counties = readOGR('../Lecture6_Overlays/Data/County_Boundaries_24K/County_Boundaries_24K.shp',layer='Co
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "../Lecture6_Overlays/Data/County_Boundaries_24K/County_Boundaries_24K.shp", layer: "County_B
## with 72 features
## It has 7 fields
## Integer64 fields read as strings:  OBJECTID DNR_CNTY_C
```

```
counties$water = a$perWater
pw = (1:4)[cut(a$perWater,breaks = c(0,2.5,5,10,25))]
plot(counties,col = viridis(4)[pw])
legend('topright',legend = c('0-2.5%','2.5-5%','5-10%','10-25%'), fill = viridis(4))
```


0−2.5%
2.5−5%
5−10%
10−25%