Determination of the scale of maximum effect

R code to determine the distance at which each land class (forest/vegetation, urbanization, open water, wetland, and agriculture) had the maximum effect on the turtles behaviours (active defensive behaviours (Aggression), time of shell emergence (Shell), binary shell emergence time (Bin.Shell), time of initial movement (Start), log (x+1) transformed version of time of initial movement (log.Start), and total time spent moving (Movement)). Shell and Start were transformed in “Mixed Models Behaviour Code” so I will need to recalculate the distance at which each land cover class has a maximum impact on the transformed behaviours (Bin.Shell and log.Start).

Packages

```
library("plyr")
library("dplyr")
library("writexl")
library("rptR")
library("tidyverse")
library("blmeco")
library("PerformanceAnalytics")
library("Hmisc")
library("pspearman")
library("lme4")
```

Upload the dataset to use

```
cor<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/Stats/Bin.She
ll.600/Correlations 2022.600.csv")
```

Function to linearize a correlation matrix

```
flattenCorrMatrix <- function(cormat, pmat) {
  ut <- upper.tri(cormat)
  data.frame(
    row = rownames(cormat)[row(cormat)[ut]],
    column = rownames(cormat)[col(cormat)[ut]],
    cor  =(cormat)[ut],
    p = pmat[ut]
  )
}
```

Preparing data

```
cor$Aggression<- as.numeric(cor$Aggression)
cor$Shell <- as.numeric(cor$Shell)
cor$Start <- as.numeric(cor$Start)
cor$log.Start <- as.numeric(cor$log.Start)
cor$Movement <- as.numeric(cor$Movement)
cor$Bin.Shell <- as.numeric(cor$Bin.Shell)
```

Correlations

Active defensive behaviours (Aggression)

Creation of the dataset

I need to create a new dataset that excludes all turtles with no observations for active defensive behaviours

```
# deletion of the NA's
cor.agres <- cor[complete.cases(cor$Aggression),]

# deletion of the columns for shell emergence time (and binary version), tota
l time spent moving, and time of initial movement (and log transformed versio
n)

drop <- c("Shell","Bin.Shell","Movement","Start","log.Start")
cor.agres = cor.agres[,!(names(cor.agres) %in% drop)]
```

Pearson correlations between active defensive behaviours and land cover for each buffer distance

```
cor.pearson.agres <- rcorr(as.matrix(cor.agres[,3:53]), type="pearson")
```

Linearization of the correlation matrix

```
table.cor.agres <- flattenCorrMatrix(cor.pearson.agres$r, cor.pearson.agres$P
)
```

Save the table with the correlation in xlsx format.

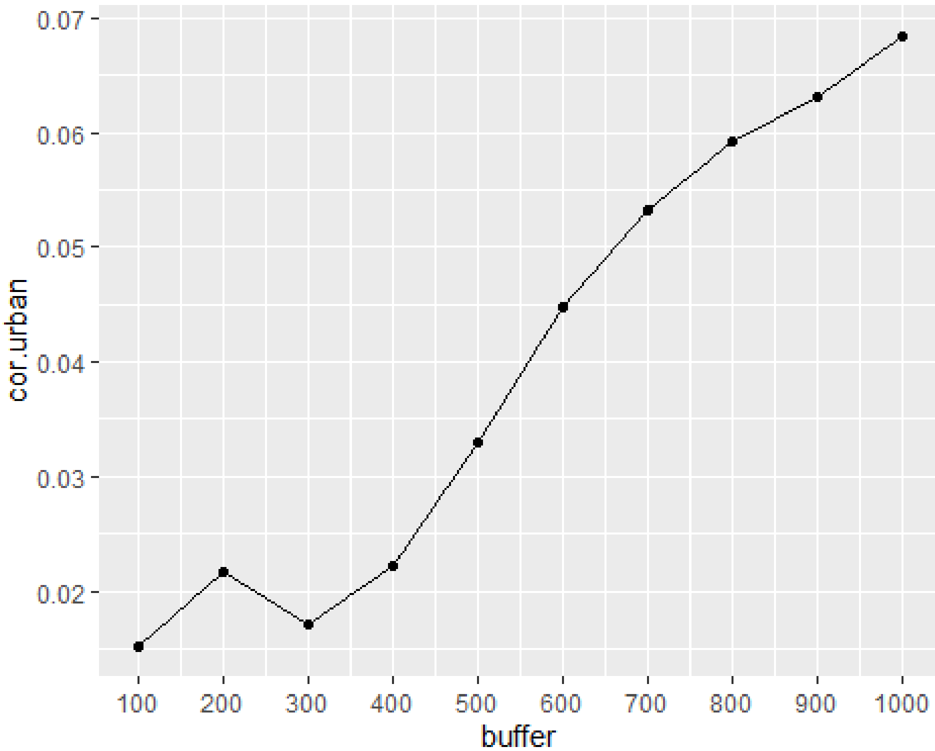
```
write_xlsx(table.cor.agres, "C:/Users/sebas/Desktop/Masters Work/Masters Work
/Stats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correl
ation Rankings/1000m Buffer Rankings/cor.agres.xlsx")
```

Upload the dataset that contain only the correlations with active defensive behaviours (delete all rows that don't have active defensive behaviours).

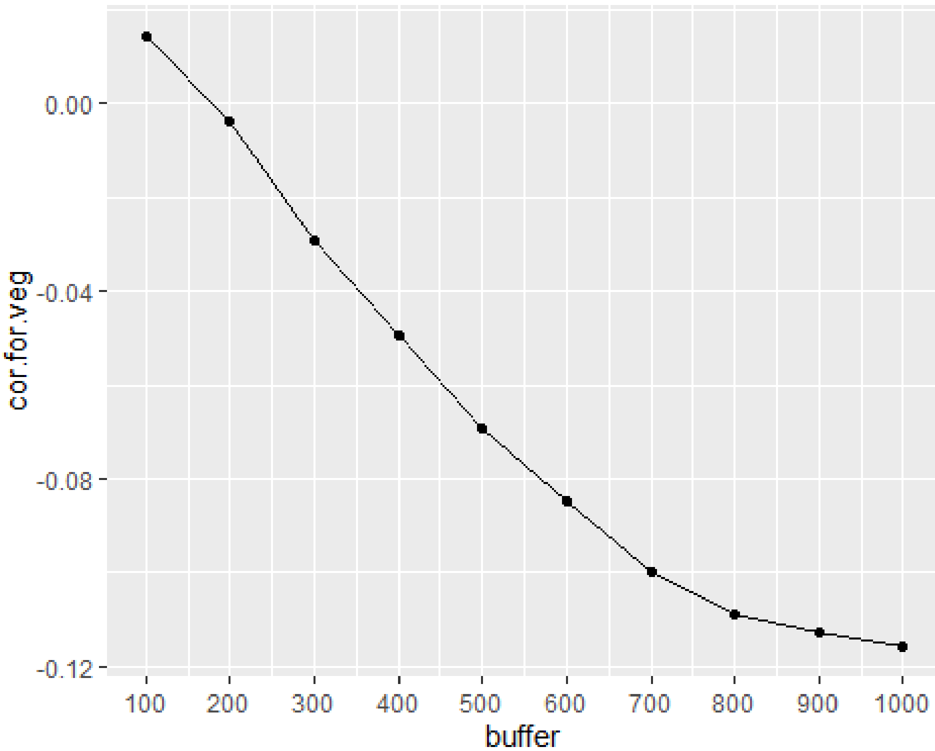
```
#I deleted the rows in Microsoft Excel
cor.agres.final<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/S
tats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correlat
ion Rankings/1000m Buffer Rankings/cor.agres.csv")
```

Graphics illustrating the correlations between active defensive behaviours and landcover types at different buffer distances

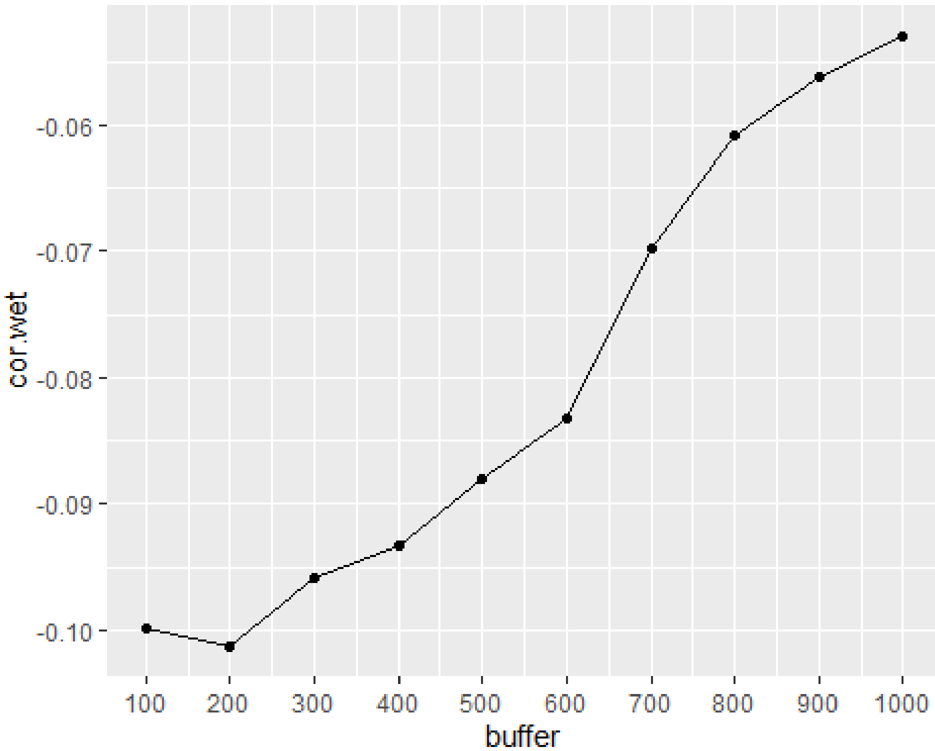
```
#Urban
ggplot(data=cor.agres.final, aes(x=buffer, y=cor.urban)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



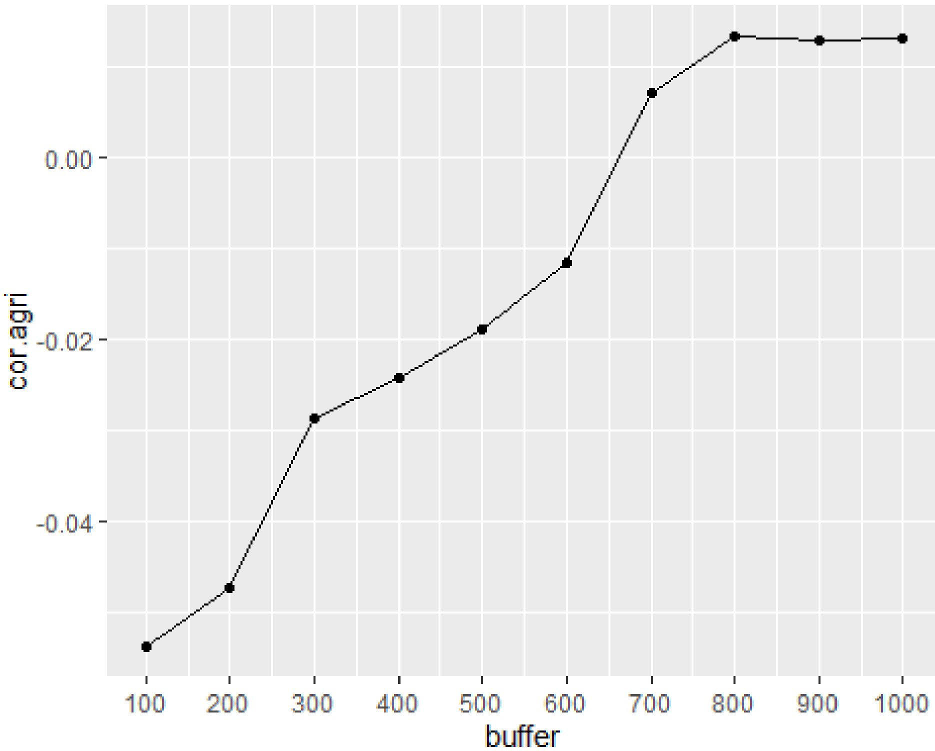

```
#Forest/Vegatation
ggplot(data=cor.agres.final, aes(x=buffer, y=cor.for.veg)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



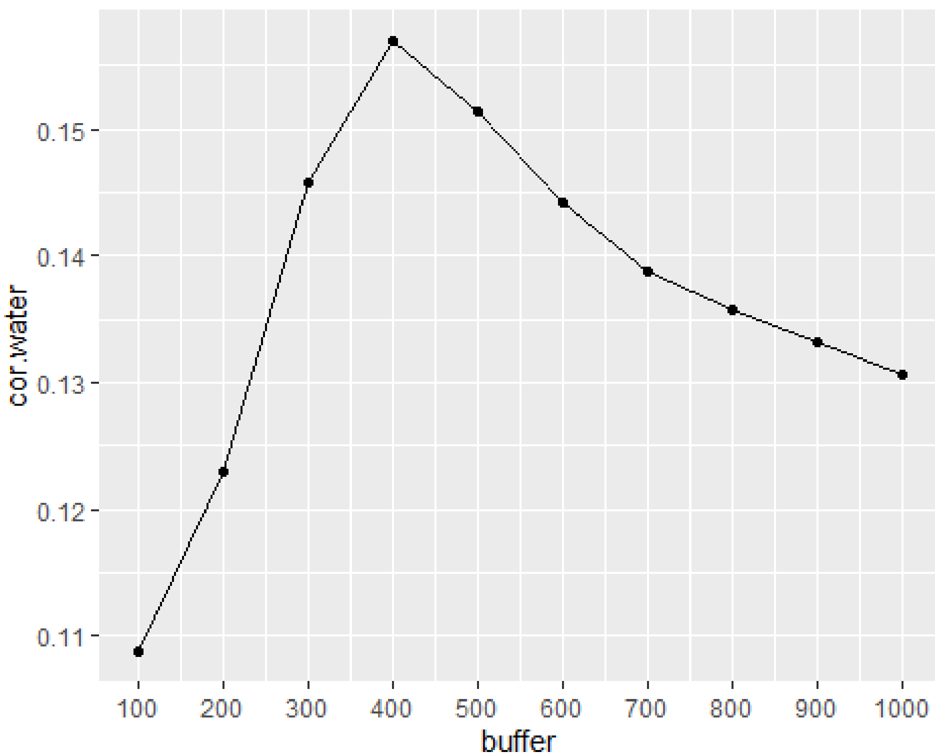

```r
#Wetland
ggplot(data=cor.agres.final, aes(x=buffer, y=cor.wet)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Agriculture
ggplot(data=cor.agres.final, aes(x=buffer, y=cor.agri)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Water
ggplot(data=cor.agres.final, aes(x=buffer, y=cor.water)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



Binary version of shell emergence time (Bin.Shell)

Creation of the dataset

I need to create a new dataset that excludes all turtles with no observation for shell emergence time (binary)

```
cor.bin.sh <- cor[complete.cases(cor$Bin.Shell),]

# deletion of the columns for active defensive behaviours, shell emergence, t
otal time spent moving, and time of initial movement (and log transformed ver
sion)

drop <- c("Aggression", "Shell", "Movement", "Start", "log.Start")
cor.bin.sh = cor.bin.sh[,!(names(cor.bin.sh) %in% drop)]
```

Pearson correlations between shell emergence time (binary) and land cover for each buffer distance

```
cor.pearson.bin.sh <- rcorr(as.matrix(cor.bin.sh[,3:53]), type="pearson")
```

Linearization of the correlation matrix

```
table.cor.bin.sh <- flattenCorrMatrix(cor.pearson.bin.sh$r, cor.pearson.bin.s
h$P)
```

Save the table with the correlation in xlsx format.

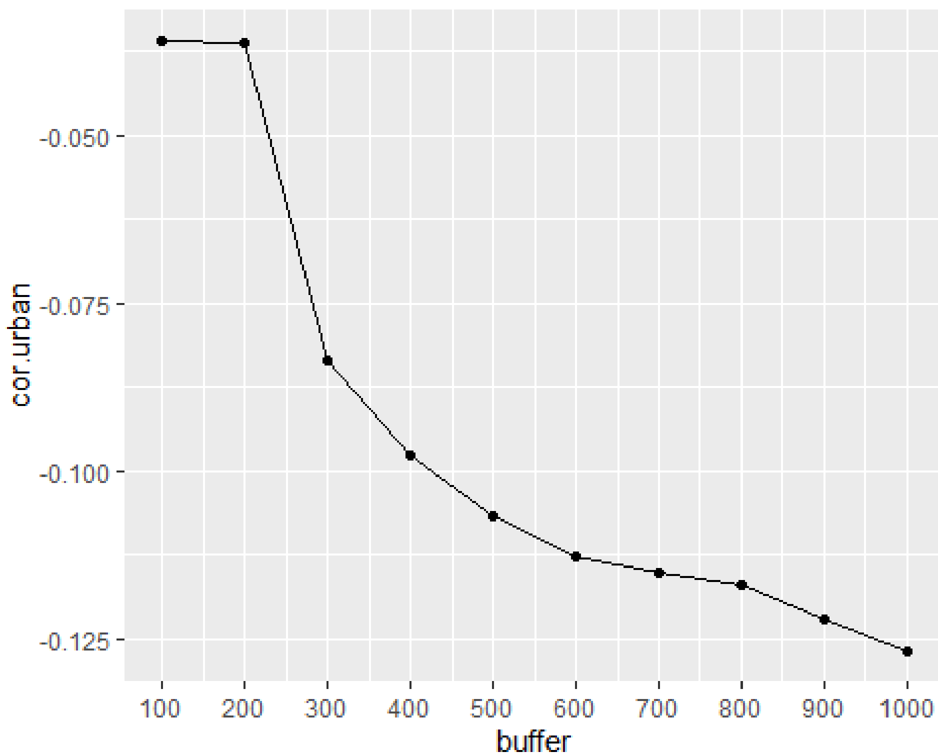
```
write_xlsx(table.cor.bin.sh, "C:/Users/sebas/Desktop/Masters Work/Masters Wor
k/Stats/Bin.Shell.600/cor.bin.sh.600.xlsx")
```

Upload the dataset that contain only the correlations with shell emergence time (binary) (delete all rows that don't have shell emergence time (binary)).

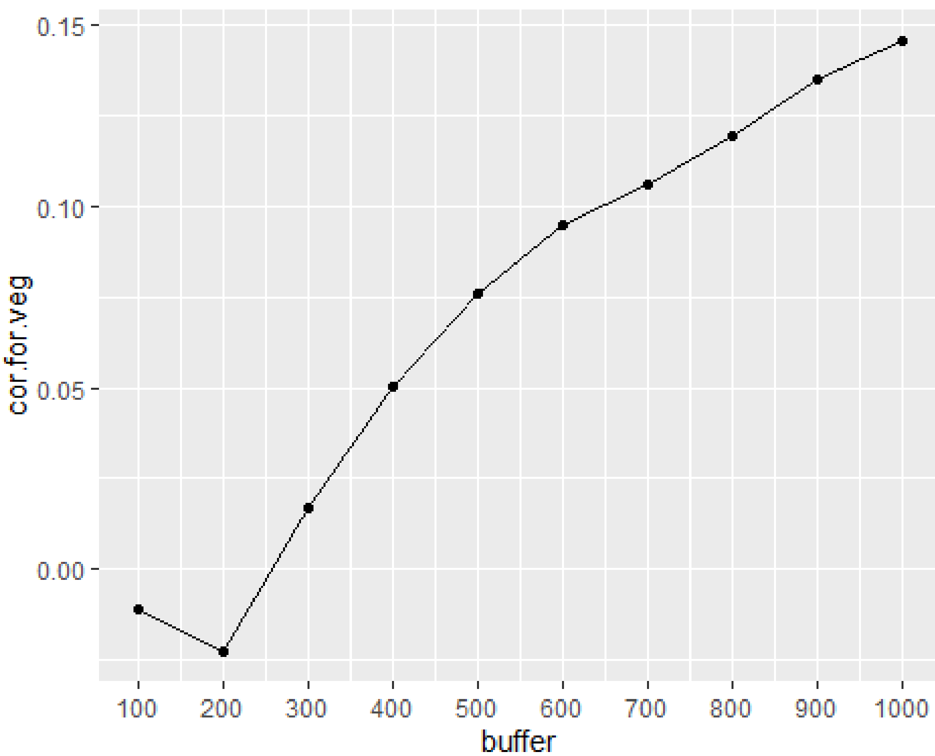
```
#I deleted the rows in Microsoft Excel
cor.bin.sh.final<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/Stats/Bin.Shell.600/cor.bin.sh.600.csv")
```

Graphics illustrating the correlations between shell emergence time (binary) and landcover types at different buffer distances

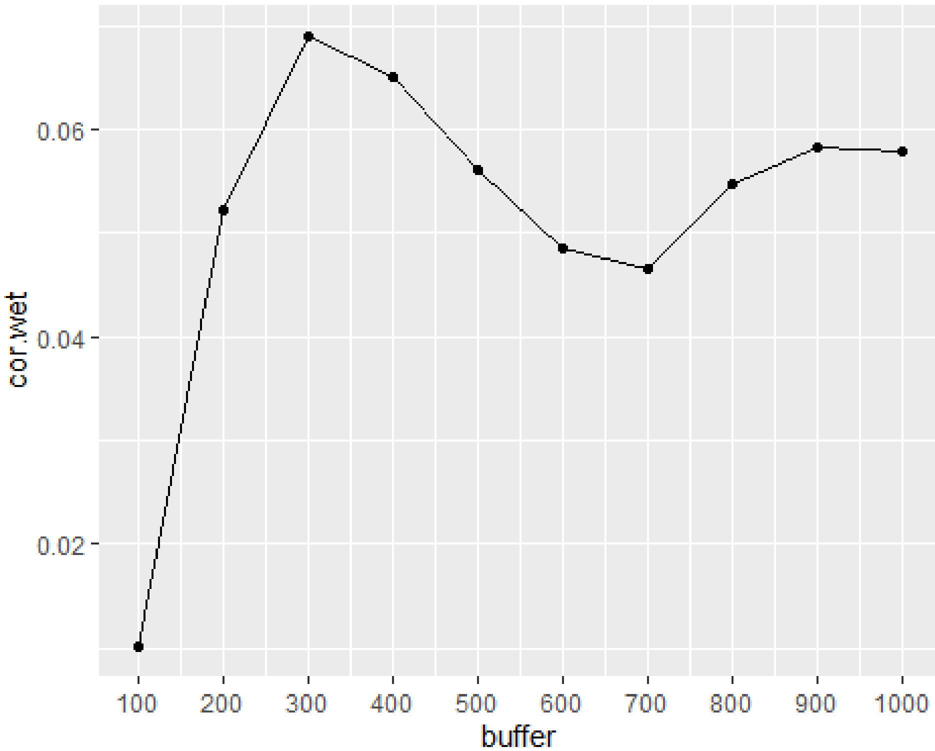
```
#Urban
ggplot(data=cor.bin.sh.final, aes(x=buffer, y=cor.urban)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



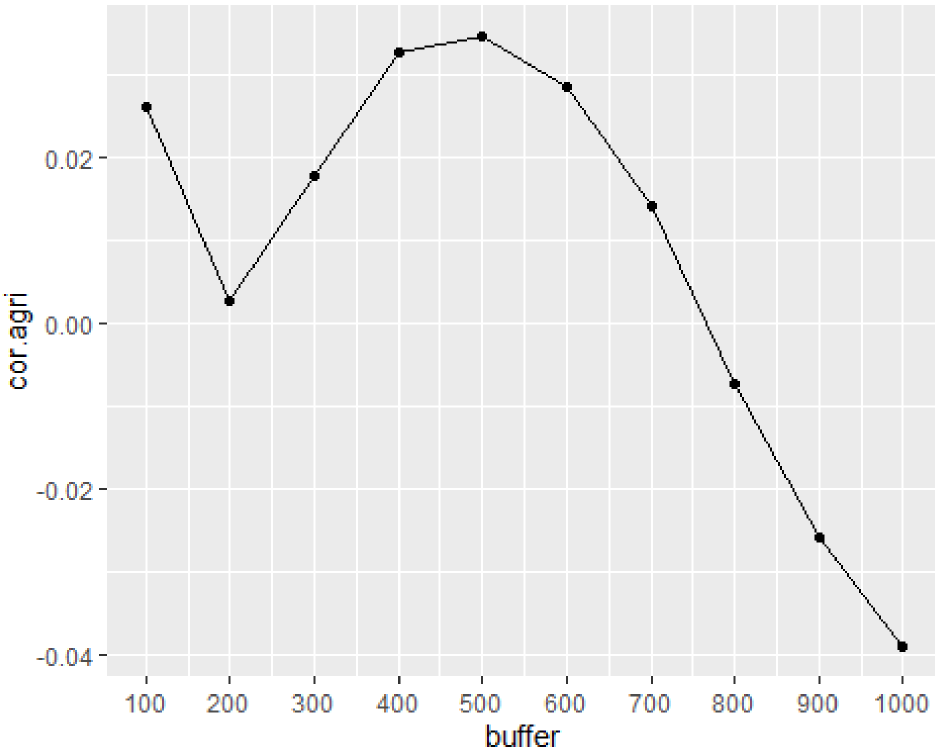

```
#Forest/Vegetation
ggplot(data=cor.bin.sh.final, aes(x=buffer, y=cor.for.veg)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



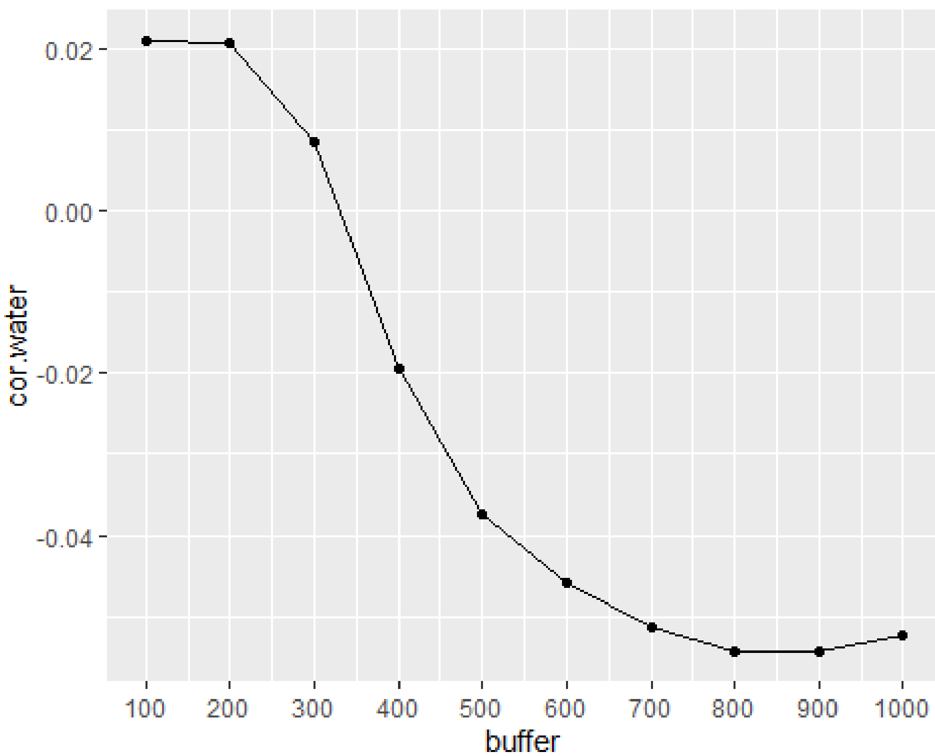

```
#Wetland
ggplot(data=cor.bin.sh.final, aes(x=buffer, y=cor.wet)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Agriculture
ggplot(data=cor.bin.sh.final, aes(x=buffer, y=cor.agri)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Water
ggplot(data=cor.bin.sh.final, aes(x=buffer, y=cor.water)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



Time of initial movement (Start)

Creation of the dataset

I need to create a new dataset that excludes all turtles with no observation for time of initial movement

```
cor.st <- cor[complete.cases(cor$Start),]

# deletion of the columns for active defensive behaviours, shell emergence (a
nd the binary version), total time spent moving, and the log transformed vers
ion of time of initial movement

drop <- c("Aggression", "Shell", "Bin.Shell", "Movement", "log.Start")
cor.st = cor.st[,!(names(cor.st) %in% drop)]
```

Pearson correlations between time of initial movement and land cover for each buffer distance

```
cor.pearson.st <- rcorr(as.matrix(cor.st[,3:53]), type="pearson")
```

Linearization of the correlation matrix

```
table.cor.st <- flattenCorrMatrix(cor.pearson.st$r, cor.pearson.st$P)
```

Save the table with the correlation in xlsx format

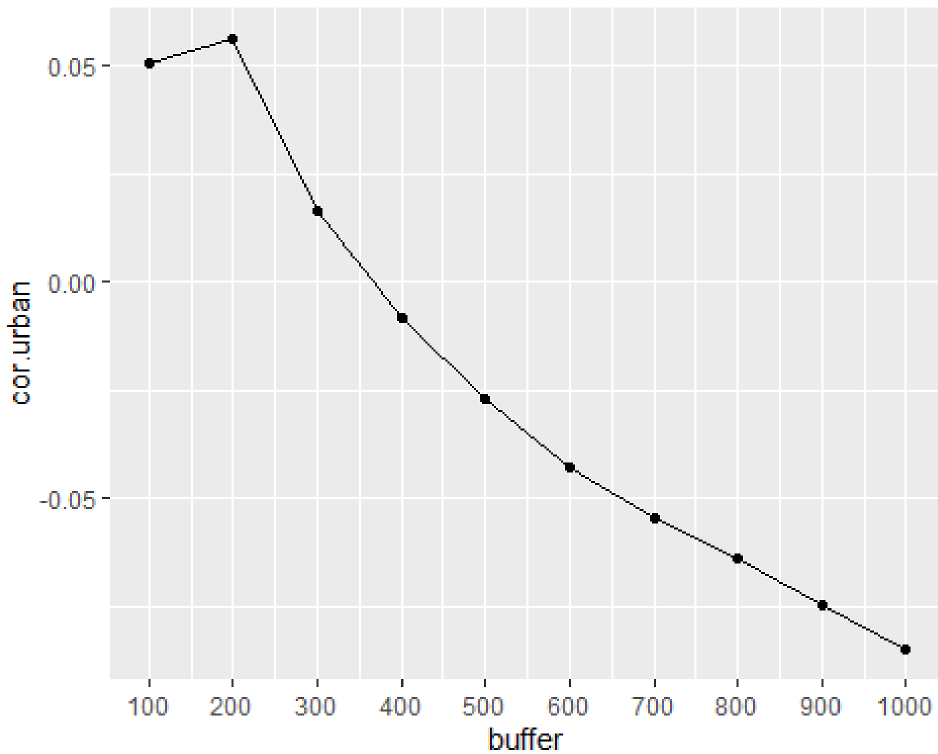
```
write_xlsx(table.cor.st, "C:/Users/sebas/Desktop/Masters Work/Masters Work/St
ats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correlati
on Rankings/1000m Buffer Rankings/cor.st.xlsx")
```

Upload the dataset that contain only the correlations with time of initial movement (delete all rows that don’t have time of initial movement).

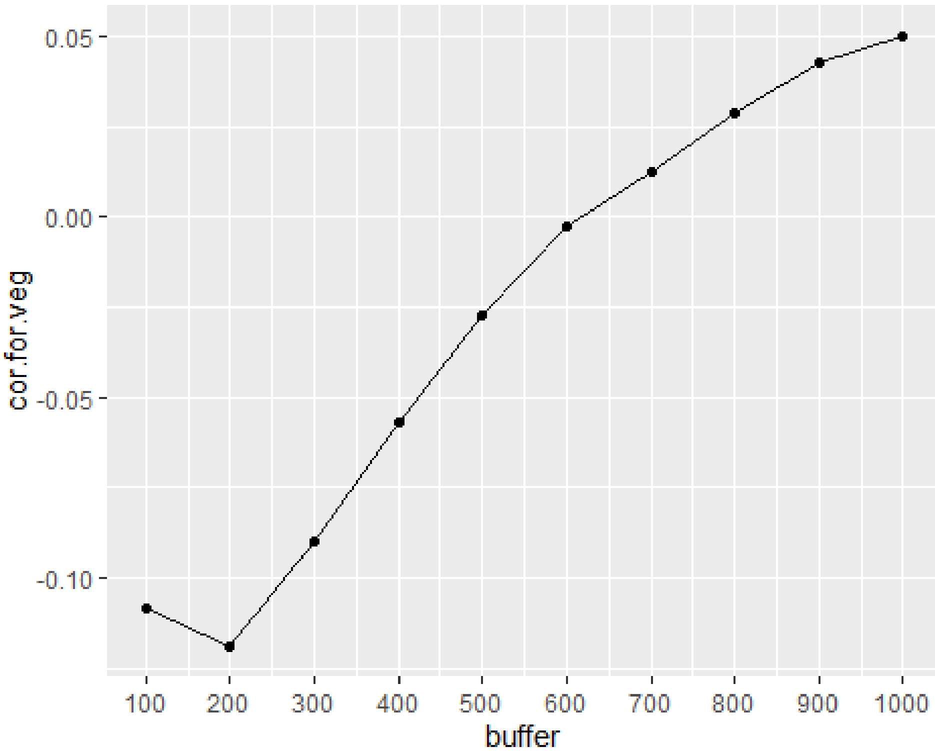
```
#I deleted the rows in Microsoft Excel
cor.st.final<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/Stats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correlation Rankings/1000m Buffer Rankings/cor.st.csv")
```

Graphics illustrating the correlations between time of initial movement and landcover types at different buffer distances

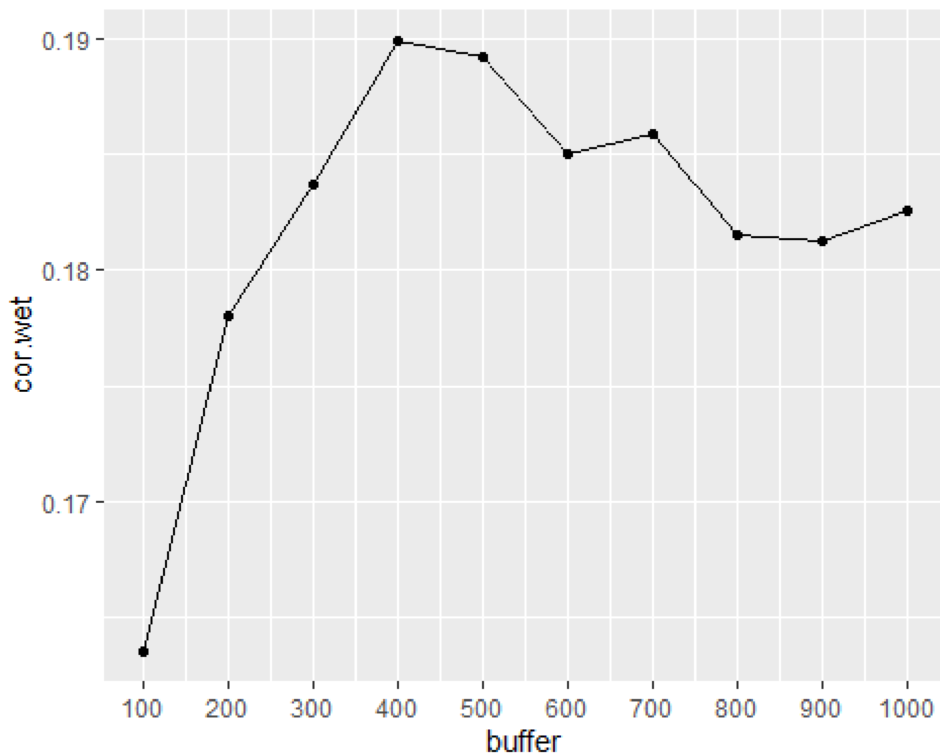
```
#Urban
ggplot(data=cor.st.final, aes(x=buffer, y=cor.urban)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



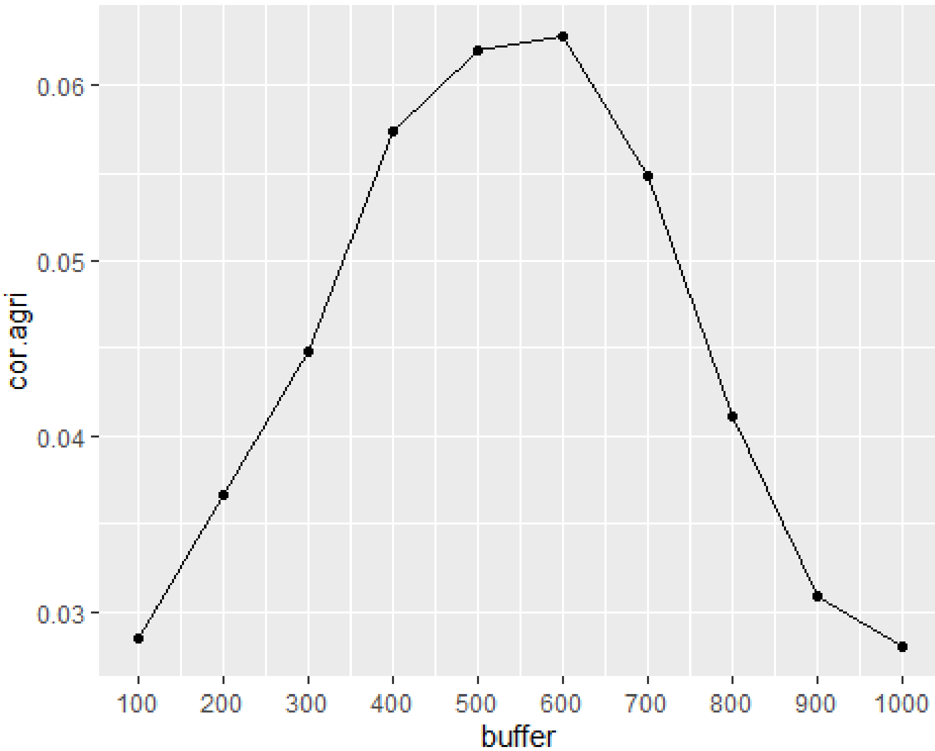

```
#Forest/Vegetation
ggplot(data=cor.st.final, aes(x=buffer, y=cor.for.veg)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



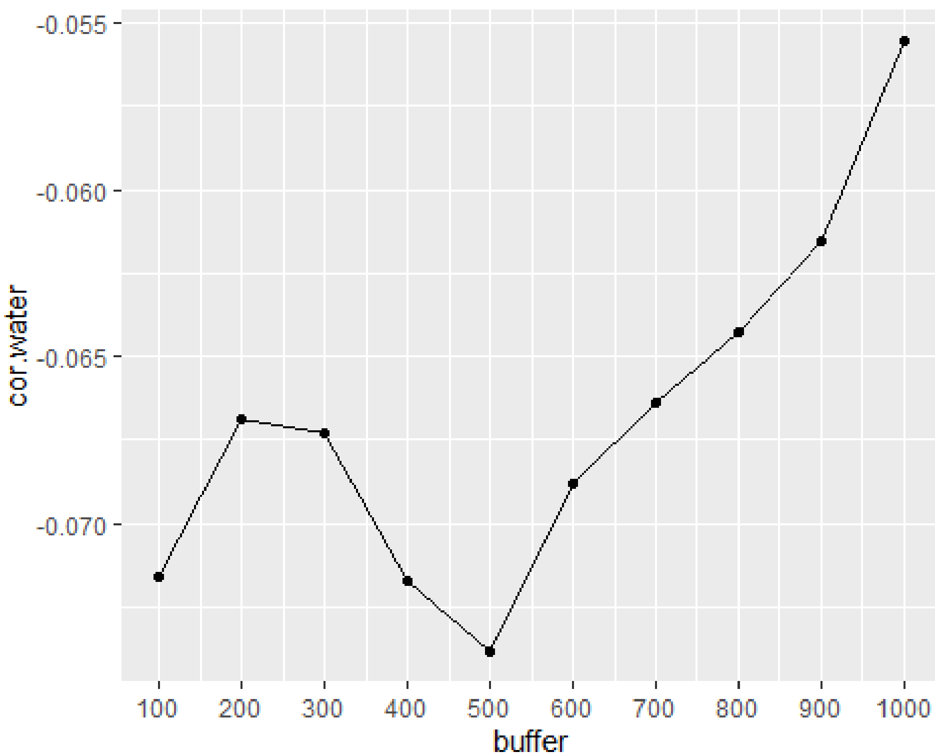

```
#Wetland
ggplot(data=cor.st.final, aes(x=buffer, y=cor.wet)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Agriculture
ggplot(data=cor.st.final, aes(x=buffer, y=cor.agri)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Water
ggplot(data=cor.st.final, aes(x=buffer, y=cor.water)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



Log(x+1) transformed version of time of initial movement (log.Start)

Creation of the dataset

I need to create a new dataset that excludes all turtles with no observation for the log(x+1) transformed version of time of initial movement

```
cor.log.st <- cor[complete.cases(cor$log.Start),]

# deletion of the columns for active defensive behaviours, shell emergence (a
nd the binary version), total time spent moving, and the time of initial move
ment

drop <- c("Aggression", "Shell", "Bin.Shell", "Movement", "Start")
cor.log.st = cor.log.st[,!(names(cor.log.st) %in% drop)]
```

Pearson correlations between log(x+1) transformed version of time of initial movement and land cover for each buffer distance

```
cor.pearson.log.st <- rcorr(as.matrix(cor.log.st[,3:53]), type="pearson")
```

Linearization of the correlation matrix

```
table.cor.log.st <- flattenCorrMatrix(cor.pearson.log.st$r, cor.pearson.log.s
t$P)
```

Save the table with the correlation in xlsx format

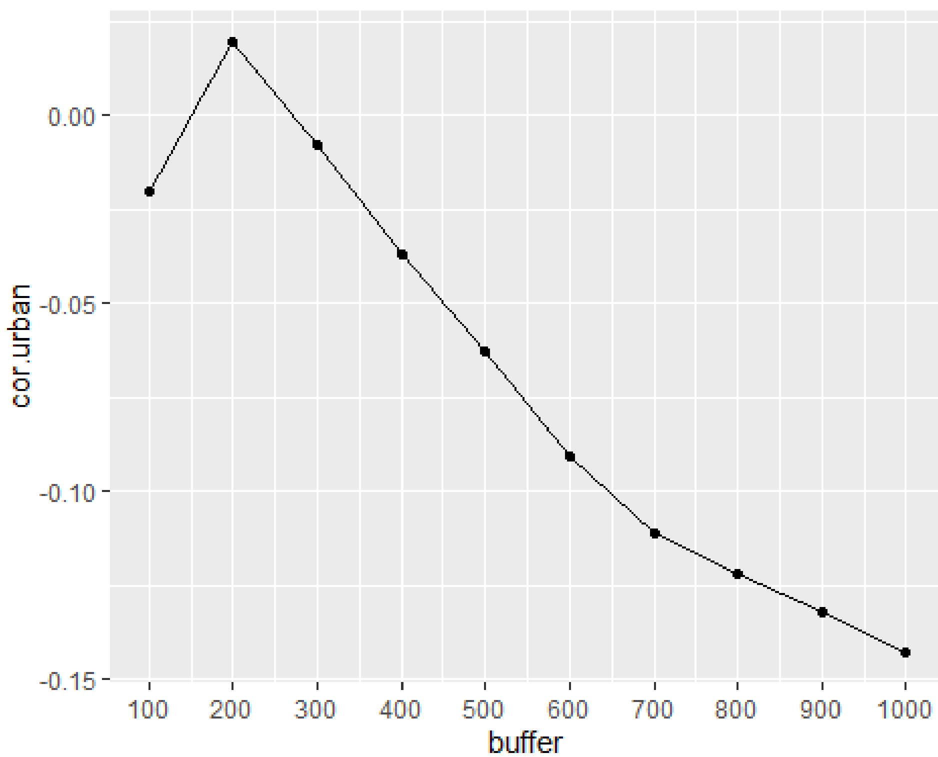
```
write_xlsx(table.cor.log.st, "C:/Users/sebas/Desktop/Masters Work/Masters Wor
k/Stats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Corre
lation Rankings/1000m Buffer Rankings/cor.log.st.xlsx")
```

Upload the dataset that contain only the correlations with log(x+1) transformed version of time of initial movement (delete all rows that don't have log(x+1) transformed version of time of initial movement).

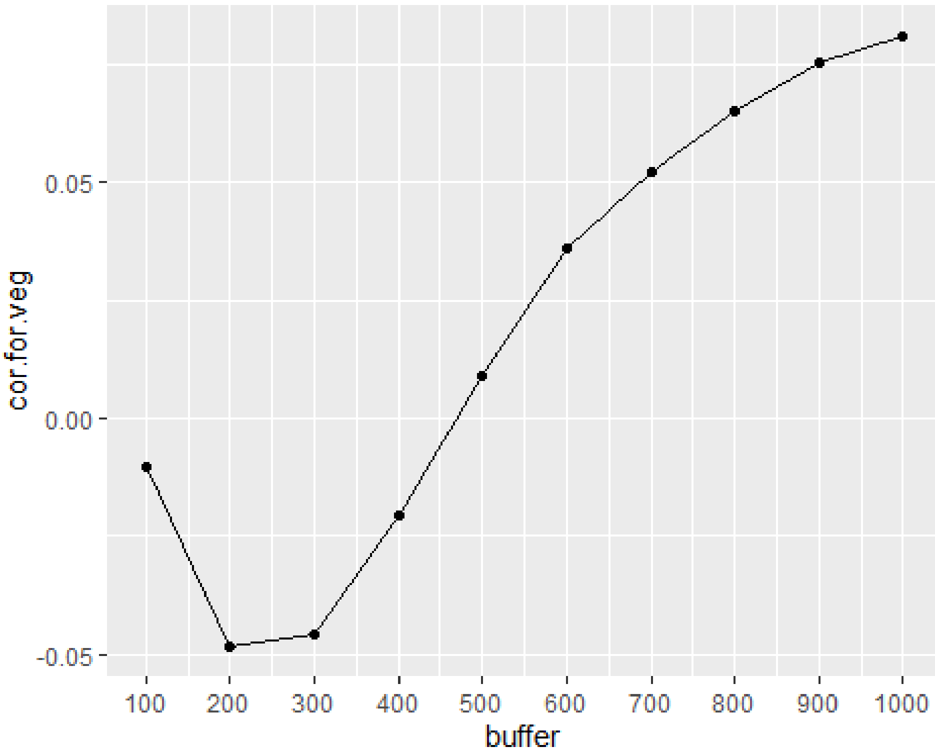
```
#I deleted the rows in Microsoft Excel
cor.log.st.final<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/
Stats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correla
tion Rankings/1000m Buffer Rankings/cor.log.st.csv")
```

Graphics illustrating the correlations between log(x+1) transformed version of time of initial movement and landcover types at different buffer distances

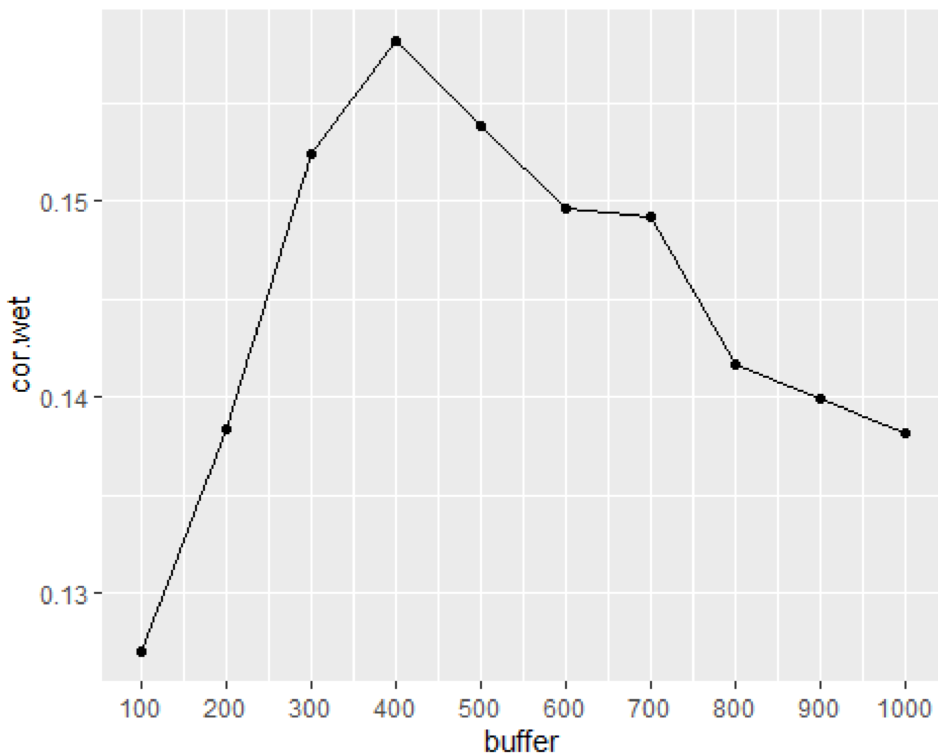
```
#Urban
ggplot(data=cor.log.st.final, aes(x=buffer, y=cor.urban)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



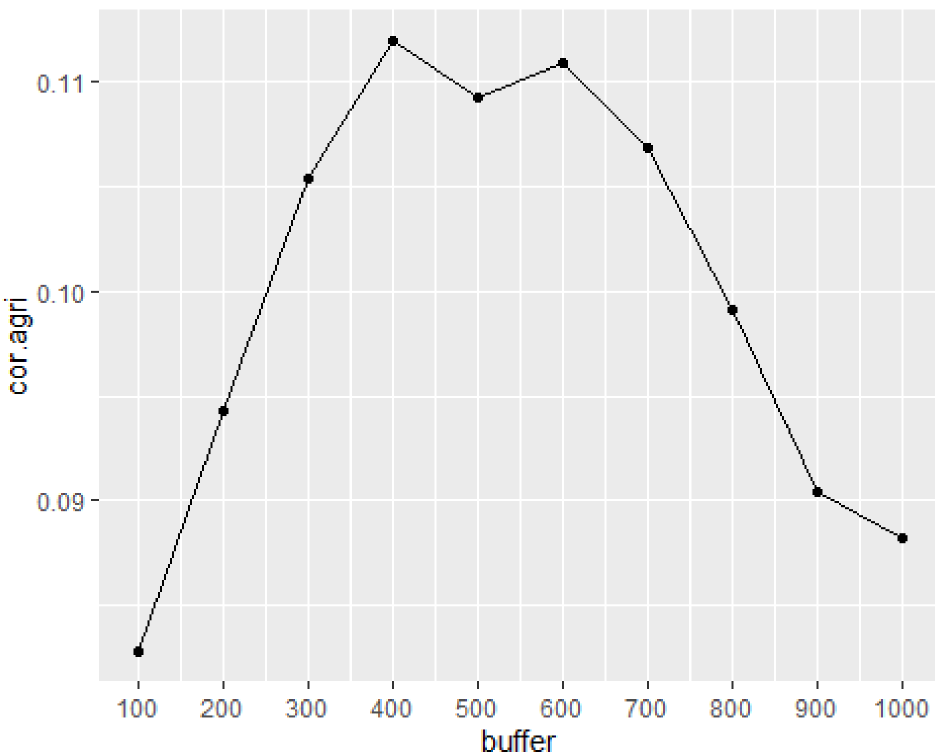

```
#Forest/Vegetation
ggplot(data=cor.log.st.final, aes(x=buffer, y=cor.for.veg)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



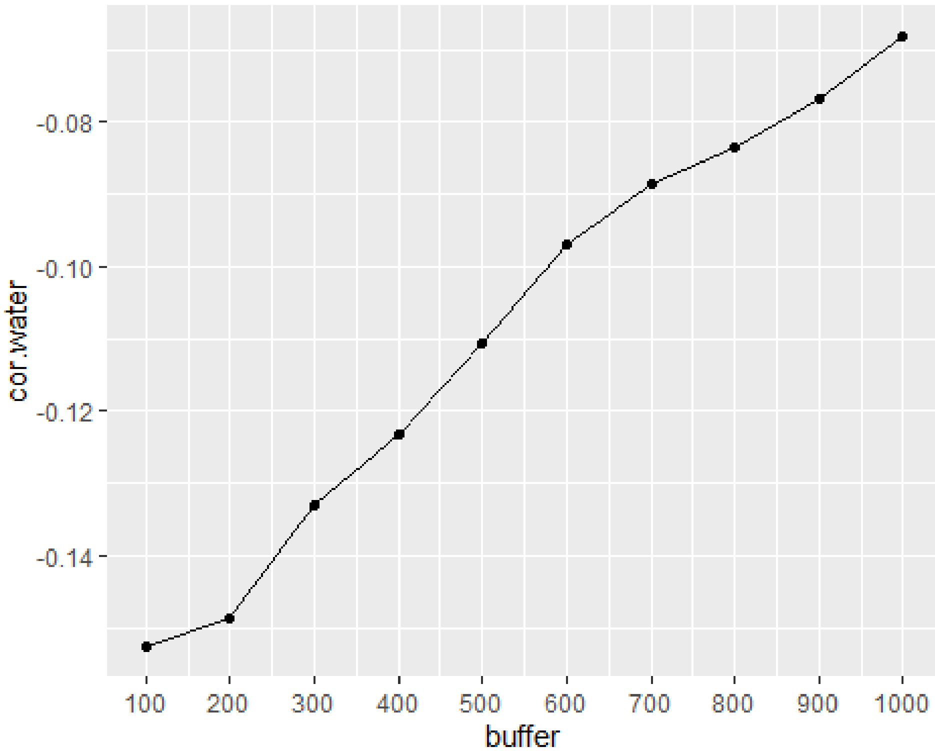

```
#Wetland
ggplot(data=cor.log.st.final, aes(x=buffer, y=cor.wet)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Agriculture
ggplot(data=cor.log.st.final, aes(x=buffer, y=cor.agri)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Water
ggplot(data=cor.log.st.final, aes(x=buffer, y=cor.water)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



Total time spent moving (Movement)

Creation of the dataset

I need to create a new dataset that excludes all turtles with no observation for total time spent moving

```
cor.mov <- cor[complete.cases(cor$Movement),]

# deletion of the columns for active defensive behaviours, shell emergence (a
nd the binary version), and the time of initial movement (and the log transfo
rmed version)

drop <- c("Aggression", "Shell", "Bin.Shell", "Start", "log.Start")
cor.mov = cor.mov[,!(names(cor.mov) %in% drop)]
```

Pearson correlations between total time spent moving and land cover for each buffer distance

```
cor.pearson.mov <- rcorr(as.matrix(cor.mov[,3:53]), type="pearson")
```

Linearization of the correlation matrix

```
table.cor.mov <- flattenCorrMatrix(cor.pearson.mov$r, cor.pearson.mov$P)
```

Save the table with the correlation in xlsx format

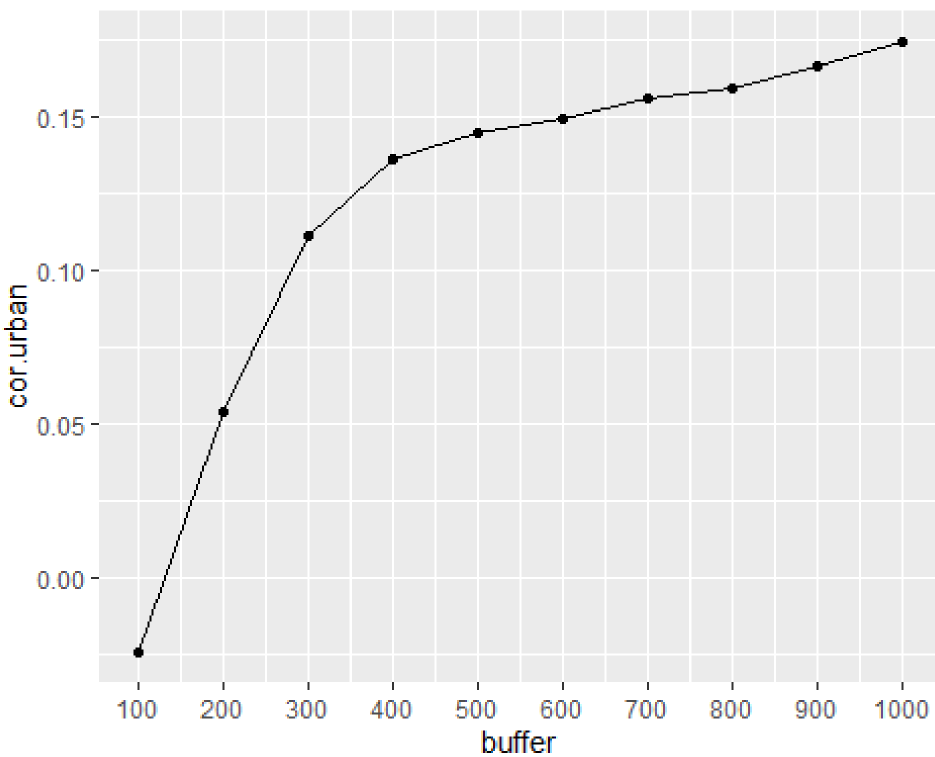
```
write_xlsx(table.cor.mov, "C:/Users/sebas/Desktop/Masters Work/Masters Work/S
tats/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correlat
ion Rankings/1000m Buffer Rankings/cor.mov.xlsx")
```

Upload the dataset that contain only the correlations with total time spent moving (delete all rows that don't have total time spent moving).

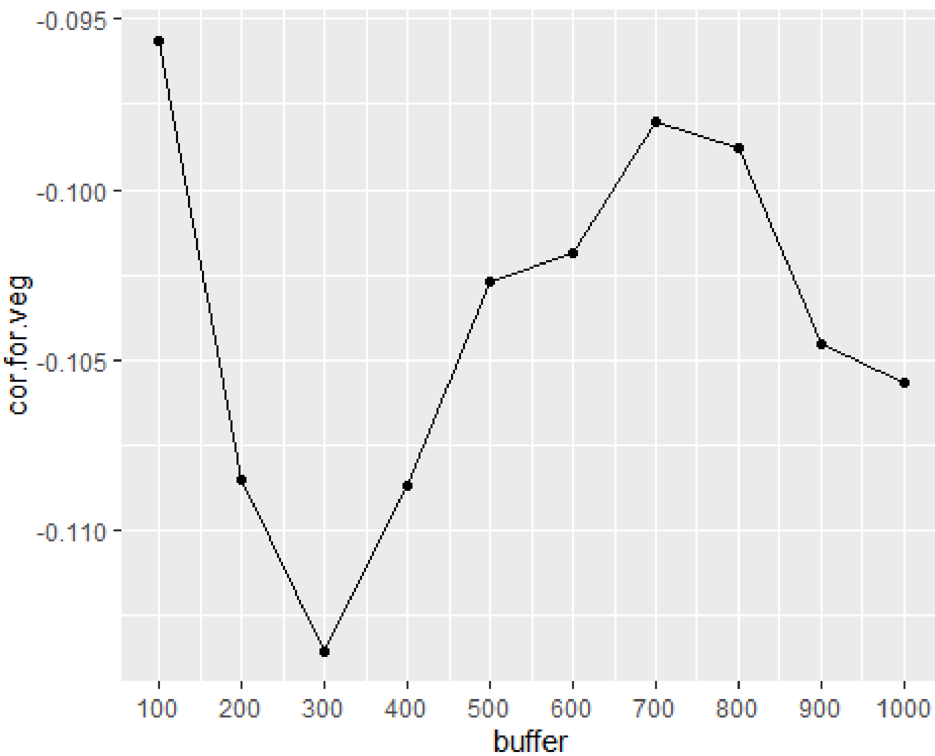
```
#I deleted the rows in Microsoft Excel
cor.mov.final<-read.csv("C:/Users/sebas/Desktop/Masters Work/Masters Work/Sta
ts/New Stats/Land Cover Correlation/Buffer Correlation/2022/Buffer Correlatio
n Rankings/1000m Buffer Rankings/cor.mov.csv")
```

Graphics illustrating the correlations between total time spent moving and landcover types at different buffer distances

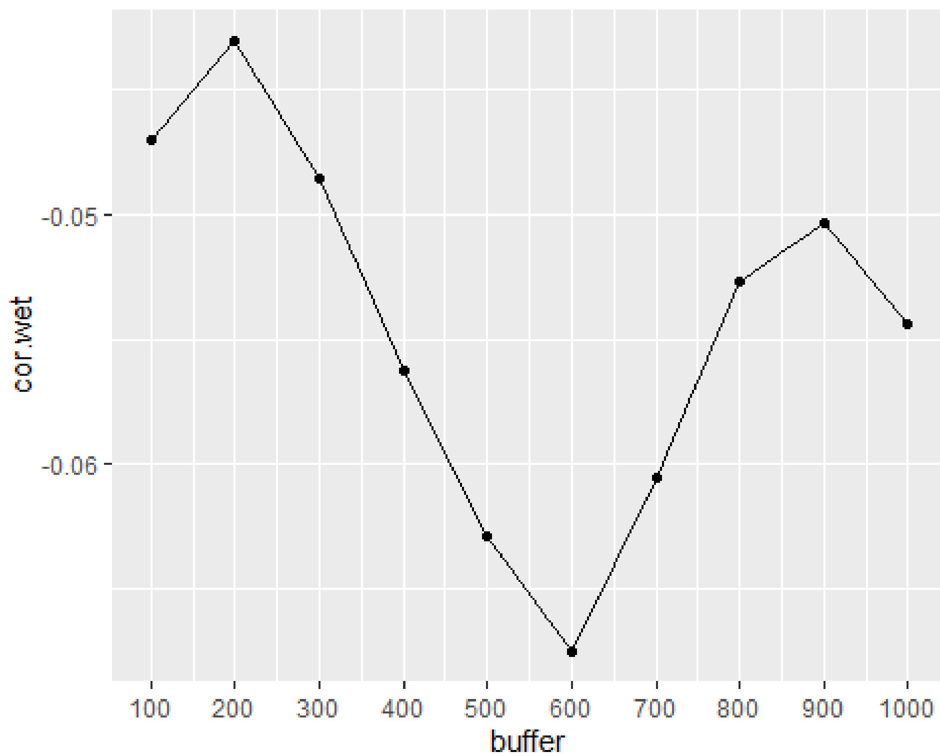
```
#Urban
ggplot(data=cor.mov.final, aes(x=buffer, y=cor.urban)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



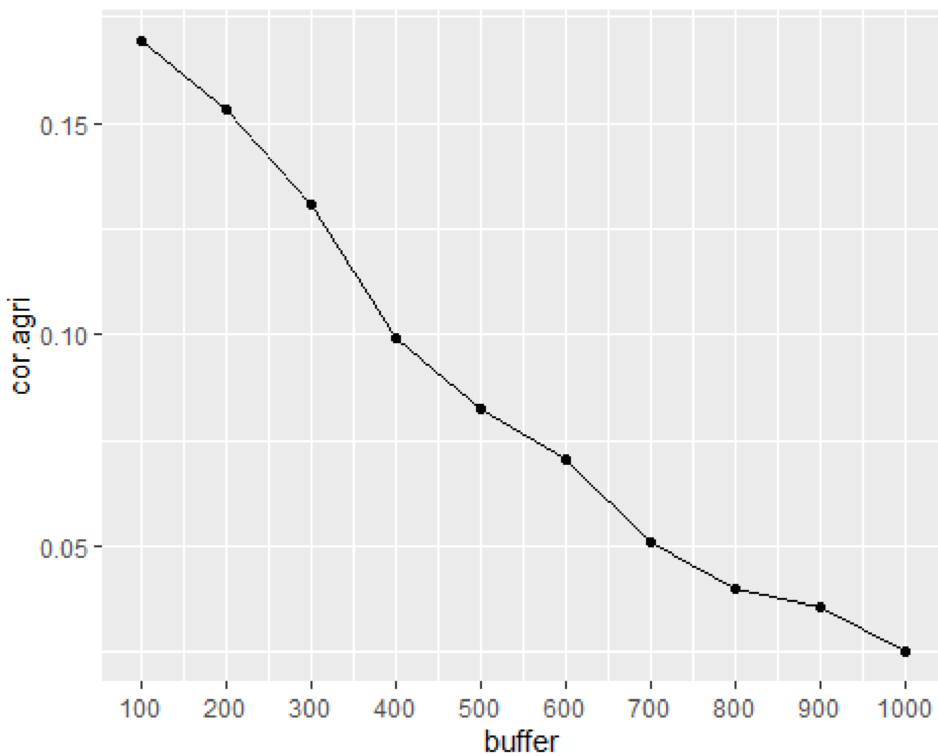

```
#Forest/Vegetation
ggplot(data=cor.mov.final, aes(x=buffer, y=cor.for.veg)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```



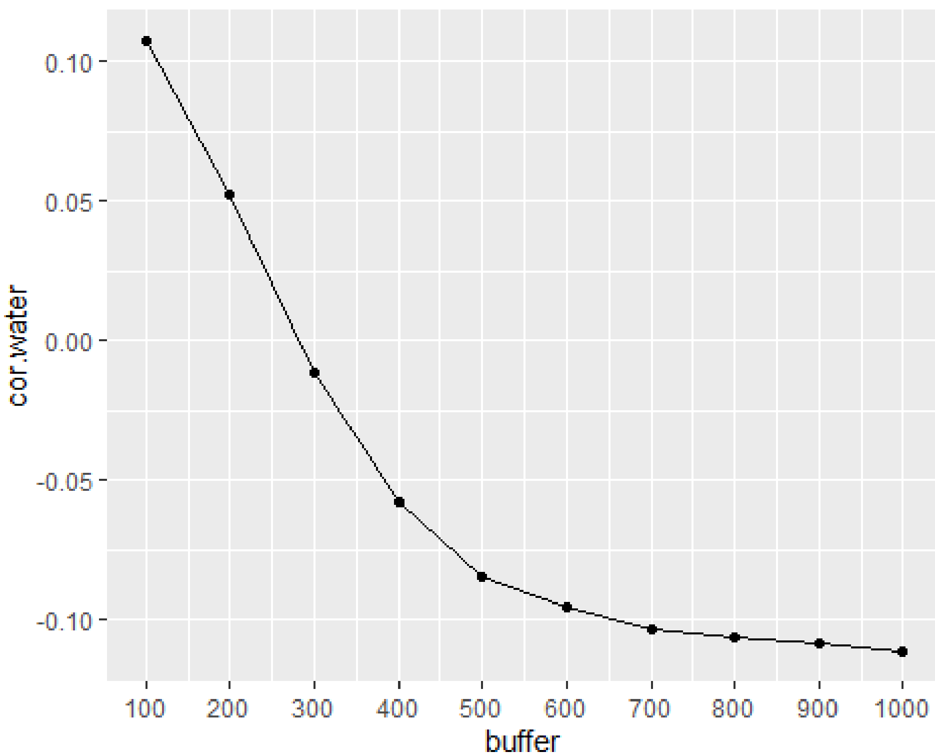

```
#Wetland
ggplot(data=cor.mov.final, aes(x=buffer, y=cor.wet)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Agriculture
ggplot(data=cor.mov.final, aes(x=buffer, y=cor.agri)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```




```
#Water
ggplot(data=cor.mov.final, aes(x=buffer, y=cor.water)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(100,200,300,400,500,600,700,800,900,1000))
```


0.10
0.05
0.00
-0.05
-0.10
cor.water
100
200
300
400
500
600
700
800
900
1000
buffer