ExaminingCovariatesII

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Repeat of covariance analysis without sites 23, 53 , 74

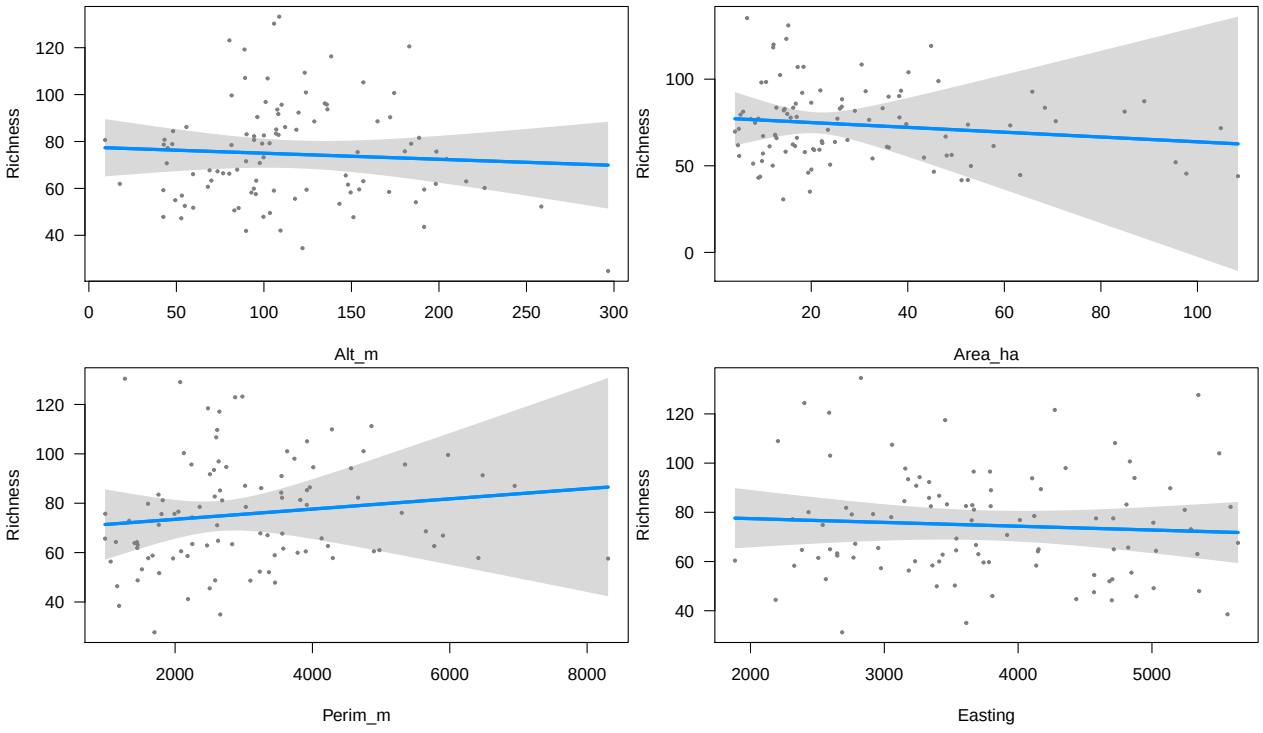
Physical Variables

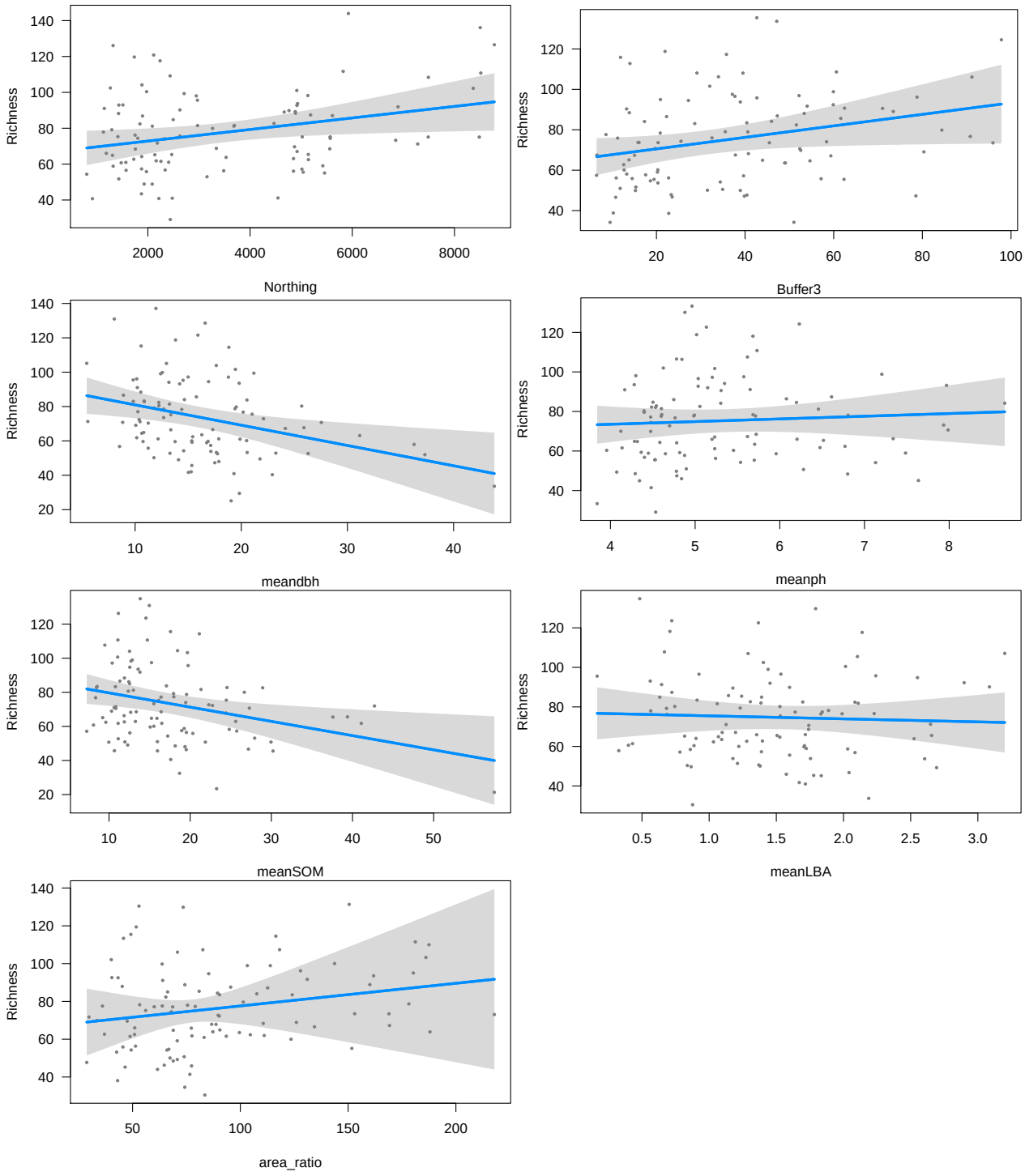
```
##  [1] "Alt_m"      "Area_ha"    "Perim_m"    "Easting"    "Northing"
##  [6] "Buffer3"    "meandbh"    "meanph"     "meanSOM"    "meanLBA"
## [11] "area_ratio"
```

Heterogeneity variables

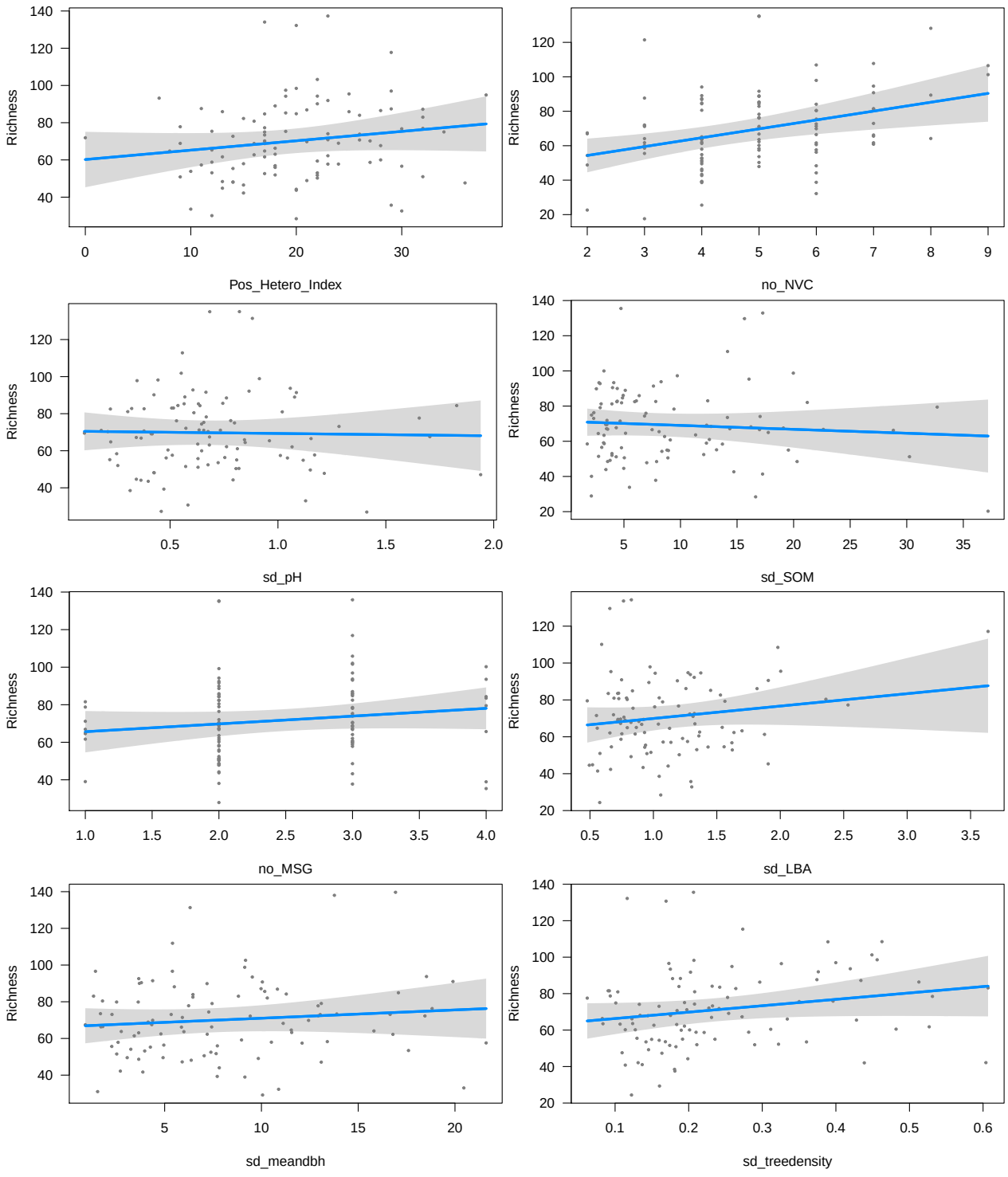
```
## [1] "Pos_Hetero_Index" "no_NVC"            "sd_pH"
## [4] "sd_SOM"           "no_MSG"            "sd_LBA"
## [7] "sd_meandbh"       "sd_treedensity"    "no_trees"
```

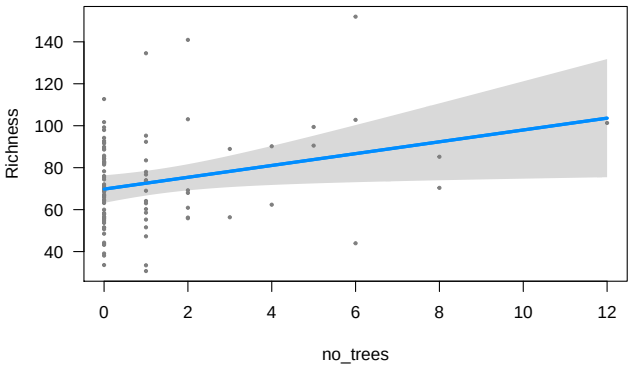
Effect of each variable on richness using multiple linear regression, simple additive model.





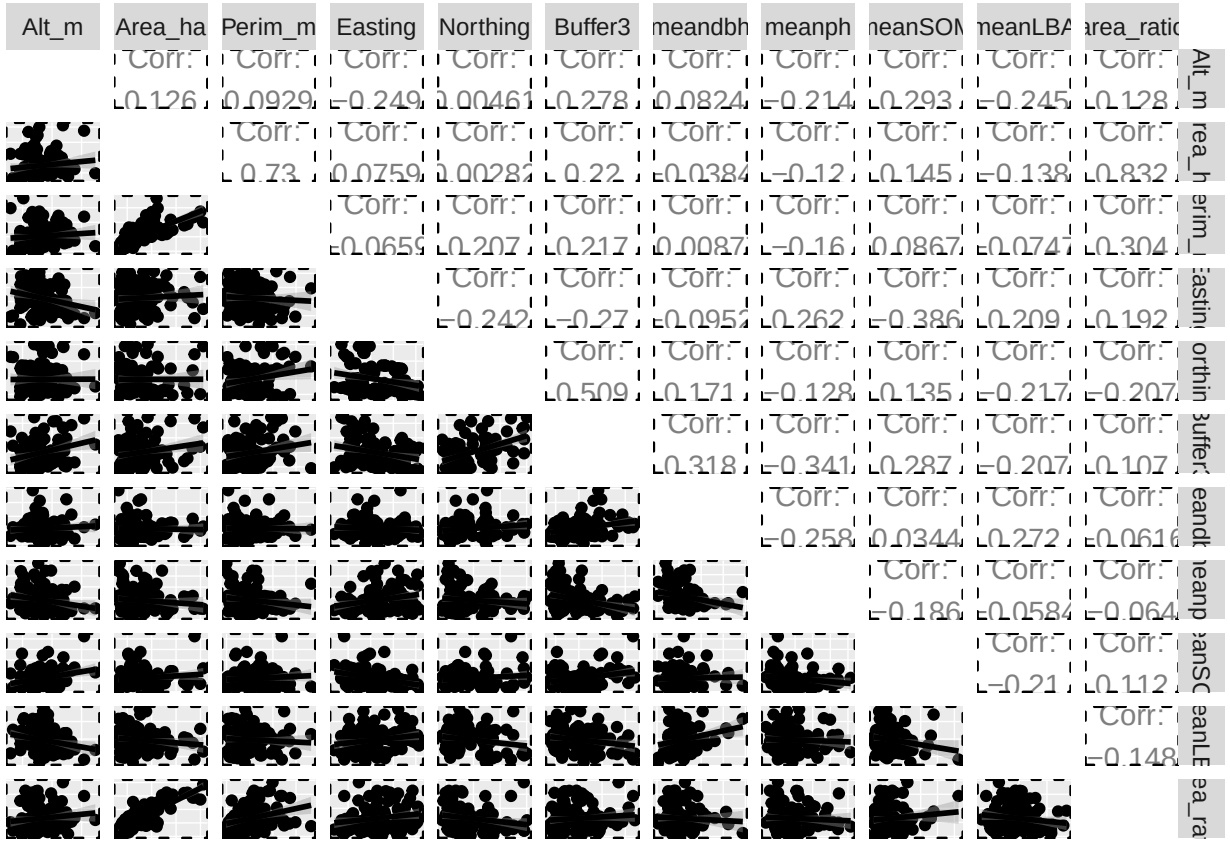
The plots show that the following variables appear to influence the species richness: Northing, Buffer, mean dbh, mean SOM, area to perimeter ratio (the weakest of the varaibles)


Richness
Pos_Hetero_Index
no_NVC
sd_pH
sd_SOM
no_MSG
sd_LBA
sd_meandbh
sd_treedensity



The plots show that the following variables appear to influence the species richness: number of NVC codes, number of sites with no trees, standard devitation of LBA.

Colinearity of variables using pair plots



The largest correlation os between area ratio and area, as you'd expect, apart from that, buffer and northing have a correlation coefficient of 0.509, easting and mean SOM have correltion coefficient of -0.386

_Hetero_In
no_NVC
sd_pH
sd_SOM
no_MSG
sd_LBA
d_meandbl
l_treedensi
no_trees
Corr: 0.0909
Corr: −0.168
Corr: 0.234
Corr: 0.0993
Corr: −0.162
Corr: 0.367
Corr: −0.212
Corr: 0.25
Corr: 0.283
Corr: 0.0588
Corr: 0.081
Corr: 0.193
Corr: 0.165
Corr: 0.103
Corr: 0.303
Corr: −0.105
Corr: −0.0483
Corr: 0.0787
Corr: 0.0647
Corr: 0.302
Corr: 0.153
Corr: 0.312
Corr: −0.2
Corr: 0.247
Corr: −0.229
Corr: 0.152
Corr: −0.16
Corr: 0.00813
Corr: −0.184
Corr: −0.053
Corr: −0.0372
Corr: 0.292
Corr: −0.226
Corr: −0.324
Corr: 0.375
Corr: −0.0666
Hetero_
no_NVC
sd_pH
sd_SOM
no_MSC
sd_LBA
meanc
treeder
no_trees

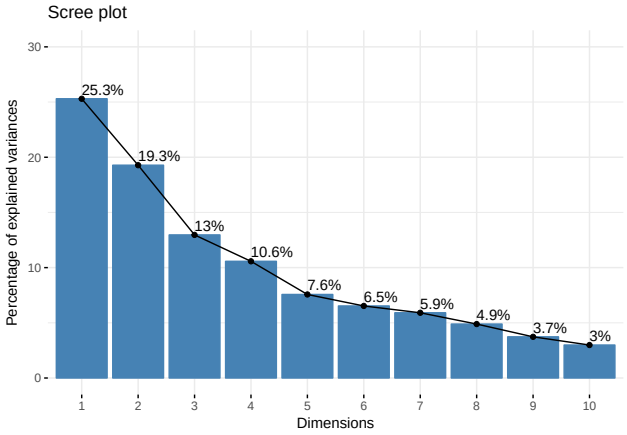
The larges correlation coefficient is -0.324 between sd tree density and sd mean dbh. sd tree desnsity and sd siol pH, number of sites with no trees and number NVC codes and number MSG and sd SOM all have coefficients around 0.3

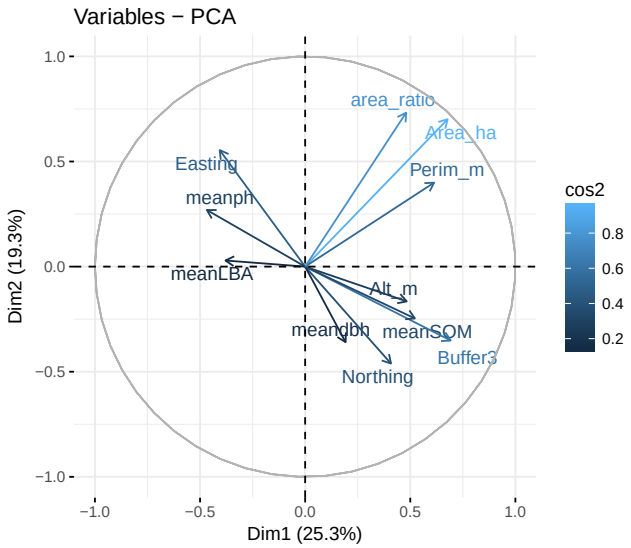
PCA

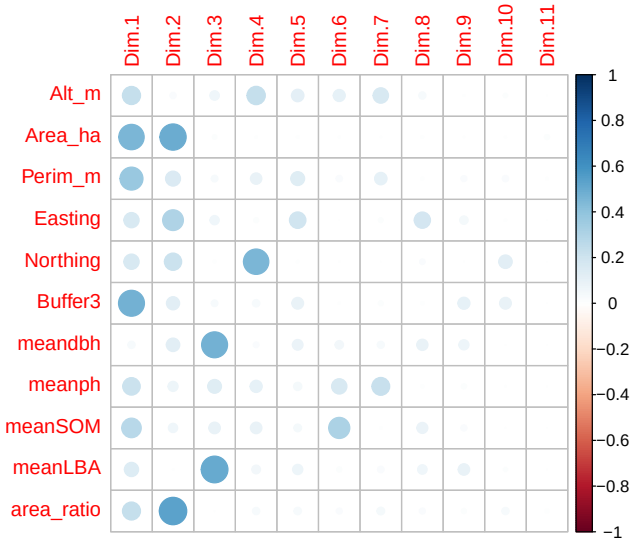
Physical variables

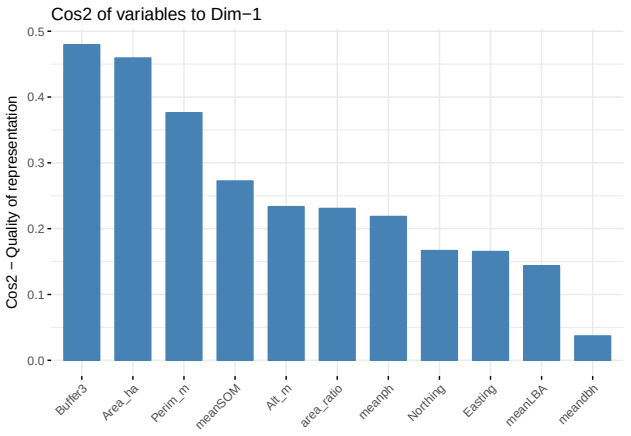
```
##        eigenvalue variance.percent cumulative.variance.percent
## Dim.1  2.78270756       25.2973415                    25.29734
## Dim.2  2.12064850       19.2786227                    44.57596
## Dim.3  1.42600773       12.9637067                    57.53967
## Dim.4  1.16297043       10.5724585                    68.11213
## Dim.5  0.83251632        7.5683302                    75.68046
## Dim.6  0.71811899        6.5283544                    82.20881
## Dim.7  0.65016271        5.9105701                    88.11938
## Dim.8  0.53769477        4.8881343                    93.00752
## Dim.9  0.41034356        3.7303960                    96.73791
## Dim.10 0.32868818        2.9880744                    99.72599
## Dim.11 0.03014125        0.2740113                   100.00000
```

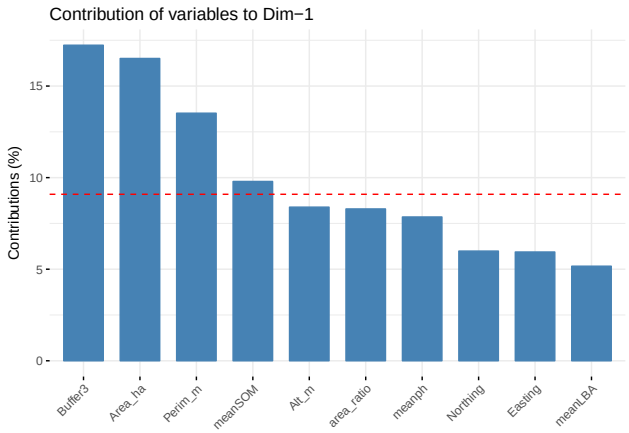
5 components explain 76% of the variance, the first 2 explain 45%

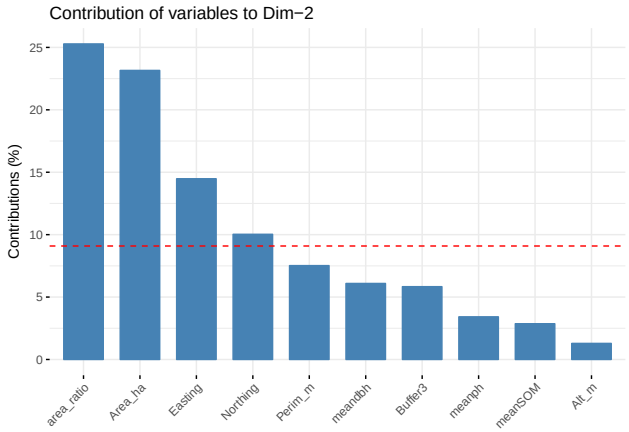



Variables − PCA
area_ratio
Area_ha
Perim_m
Easting
meanph
meanLBA
Alt_m
meandbh
meanSOM
Buffer3
Northing
cos2
0.8
0.6
0.4
0.2
Dim2 (19.3%)
Dim1 (25.3%)
1.0
0.5
0.0
−0.5
−1.0


Dim.1
Dim.2
Dim.3
Dim.4
Dim.5
Dim.6
Dim.7
Dim.8
Dim.9
Dim.10
Dim.11
Alt_m
Area_ha
Perim_m
Easting
Northing
Buffer3
meandbh
meanph
meanSOM
meanLBA
area_ratio
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1


Cos2 of variables to Dim−1
Cos2 − Quality of representation
0.5
0.4
0.3
0.2
0.1
0.0
Buffer3
Area_ha
Perim_m
meanSOM
Alt_m
area_ratio
meanph
Northing
Easting
meanLBA
meandbh

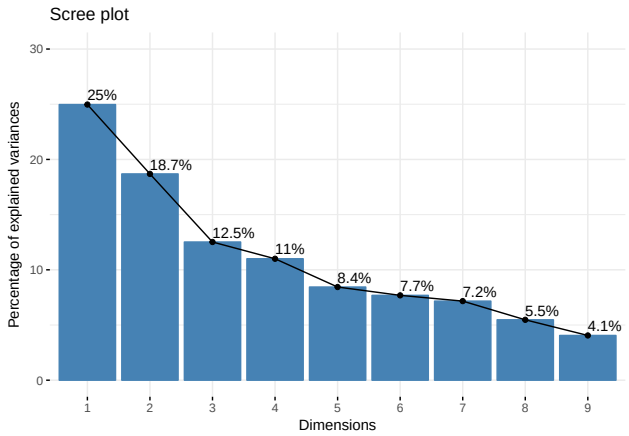


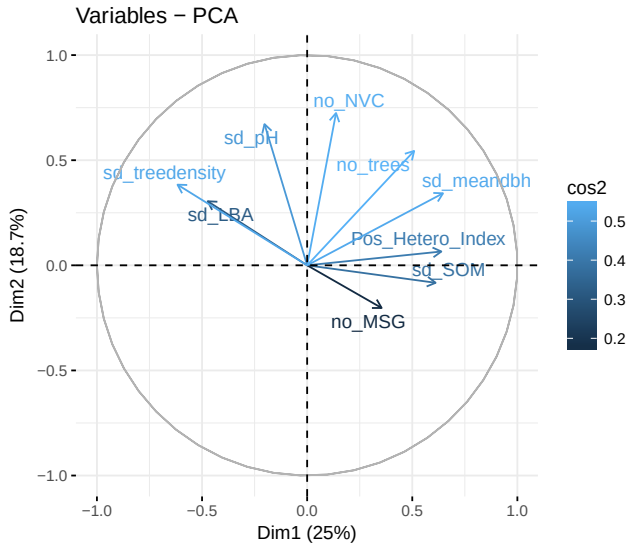


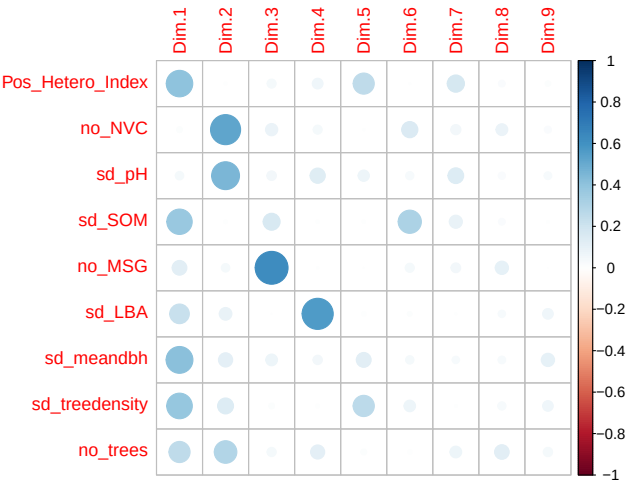
Area and buffer contribute to the first component, area ratio and area to the second, mean dbh and mean LBA to the third, northing and altitude to the fourth. The PCA suggests including these variables. The multiple linear regression shows a positive correaltion of Northing, buffer, mean dbh, and mean SOM to richness.

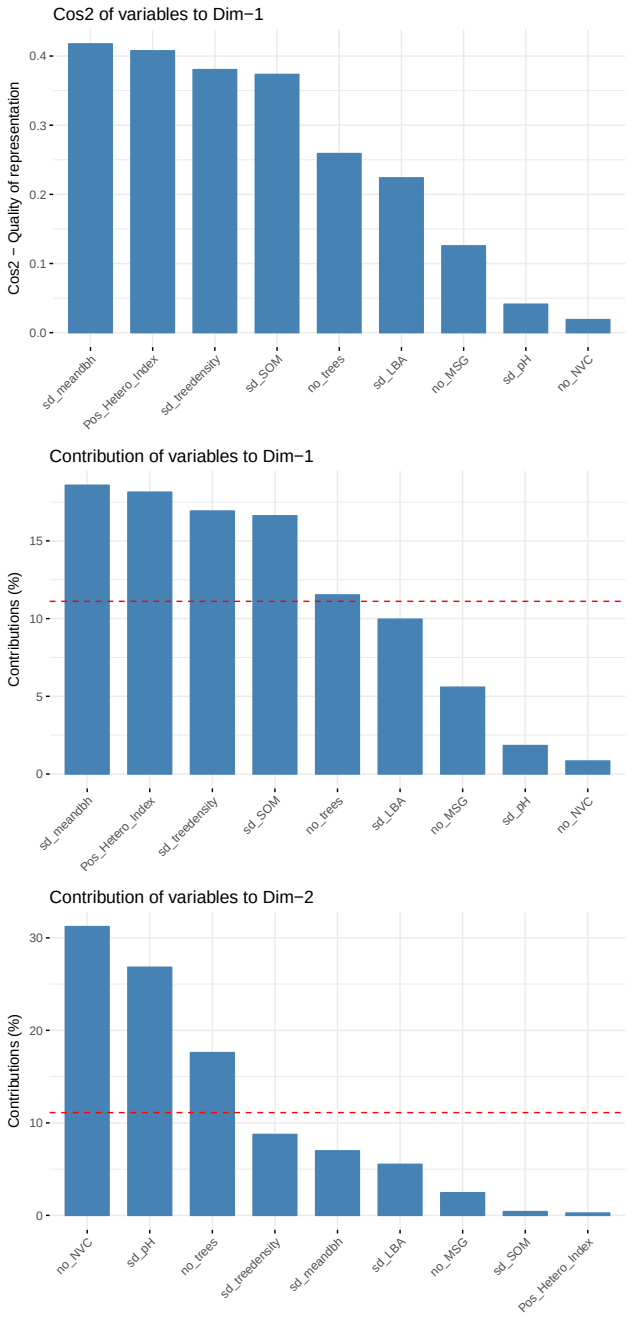
```
##       eigenvalue variance.percent cumulative.variance.percent
## Dim.1  2.2475416        24.972684                    24.97268
## Dim.2  1.6819087        18.687874                    43.66056
## Dim.3  1.1267328        12.519254                    56.17981
## Dim.4  0.9901760        11.001956                    67.18177
## Dim.5  0.7597468         8.441632                    75.62340
## Dim.6  0.6917863         7.686514                    83.30991
## Dim.7  0.6448447         7.164941                    90.47486
## Dim.8  0.4924388         5.471542                    95.94640
## Dim.9  0.3648242         4.053603                   100.00000
```

75% of variance is expressed by the first 5 components, 41% by the first 2


Scree plot
Percentage of explained variances
Dimensions
25%
18.7%
12.5%
11%
8.4%
7.7%
7.2%
5.5%
4.1%


Variables − PCA
Dim2 (18.7%)
Dim1 (25%)
cos2
no_NVC
sd_pH
no_trees
sd_meandbh
sd_treedensity
sd_LBA
Pos_Hetero_Index
sd_SOM
no_MSG


Dim.1
Dim.2
Dim.3
Dim.4
Dim.5
Dim.6
Dim.7
Dim.8
Dim.9
Pos_Hetero_Index
no_NVC
sd_pH
sd_SOM
no_MSG
sd_LBA
sd_meandbh
sd_treedensity
no_trees



The standard deviation of soil organic matter, tree density, mean dbh and positive heterogeneity index contribute the first principle component. Number of NVC codes, sd of soil pH to the second. The corr plot shows sd SOM increases with sd of tree density and sd of mean dbh, and that number of NVC codes increase with sd of soil pH.

The PCA suggests including sd SOM, sd mean dbh, sd tree density, number NVC, sd pH, number NVC. The multiple inear regression shows that Positive heero index, number of NVC and number of plots with no trees correlate positively with richness.