



Royal Netherlands  
Meteorological Institute  
*Ministry of Infrastructure and the  
Environment*

## Short introduction to shapefiles in R

Martin Roth



# Shapefile

- ▶ **popular** geospatial data format for GIS software
- ▶ developed and regulated by ESRI but mostly open specification
- ▶ can describe vector features: points, lines, and polygons
- ▶ each item usually has attributes
- ▶ drawbacks: null values (ESRI uses 0), poor with unicode, limited length of attribute names



# Libraries used

```
library(sp)
library(rgdal)
library(rgeos)
library(ggplot2)
library(ggmap)
library(data.table)
```



# Spatial...DataFrame

Within R the *sp* package provides the equivalent data structures:

- ▶ `SpatialPointsDataFrame`
- ▶ `SpatialLinesDataFrame`
- ▶ `SpatialPolygonsDataFrame`



# Read water board shapefile

```
filename      <- "./data/Waterschapsgrenzen_28992/"
layername     <- "Waterschapsgrenzen_28992"
waterschappen <- readOGR(filename, layername)

## Error in ogrInfo(dsn = dsn, layer = layer,
encoding = encoding, use_iconv = use_iconv, :
#> Cannot open file
```



## Calculate area

```
infoWaterschap <- data.table(  
    name = waterschapen$waterschap,  
    area = gArea(waterschapen, byid=TRUE) / 1e+6 )  
  
## Error in data.table(name =  
waterschapen$waterschap, area =  
gArea(waterschapen, : object 'waterschapen'  
not found  
  
setkey(infoWaterschap, area)  
  
## Error in setkey(infoWaterschap, area):  
object 'infoWaterschap' not found
```



## Transform and write data

```
waterschappen<- spTransform(  
  waterschappen,  
  CRS ("+proj=longlat"))  
  
## Error in spTransform(waterschappen,  
CRS ("+proj=longlat")) : object 'waterschappen'  
not found
```

```
writeOGR(waterschappen,  
  dsn="foldername",  
  layer="layername",  
  driver="ESRI Shapefile")
```



# Mean rainfall

```
waterschapen.dat <-
  data.table(fortify(waterschapen))

waterschapen.dat[, # fake data!
  meanRainfall := rnorm(1, 750, 25), by = id]

ggplot(waterschapen.dat,
  aes(x = long, y = lat,
      fill = meanRainfall,
      group = group)) +
  geom_polygon() + coord_fixed(ratio = 31/19)
```



```
## Error in fortify(waterschapen): object
'waterschapen' not found
## Error in eval(expr, envir, enclos): object
'waterschapen.dat' not found
## Error in ggplot(waterschapen.dat, aes(x =
long, y = lat, fill = meanRainfall, : object
'waterschapen.dat' not found
```



# Subsetting and ggmap I

```
ValleiEnVeluwe <- subset(waterschappen,  
waterschappen$waterschap == "Vallei & Veluwe")  
ValleiEnVeluwe <- fortify(ValleiEnVeluwe)
```

```
basemap <- ggmap(get_map(  
  location = c(lon = 5.75, lat = 52.25),  
    color = "color",  
    source = "google",  
    maptype = "satellite",  
    zoom = 8))
```

```
basemap + geom_path(aes(x = long, y = lat),  
  col = "red", size = 1, data = ValleiEnVeluwe)
```



```
## Error in subset(waterschappen,  
waterschappen$waterschap == "Vallei & Veluwe") :  
object 'waterschappen' not found  
## Error in fortify(ValleiEnVeluwe) : object  
'ValleiEnVeluwe' not found  
## Error in fortify(data) : object  
'ValleiEnVeluwe' not found
```



# Data selection

```
library(knmiR)

quakes <- Earthquakes("induced",
                       area = Groningen,
                       period = "2016",
                       path=NULL)

basemap + geom_point(data=quakes,
                      alpha=0.3, col = "#d95f0e")
```



```
## Downloading data from  
www.knmi.nl/kennis-en-datacentrum/dataset/aardbevin  
## Map from URL :  
http://maps.googleapis.com/maps/api/staticmap?center
```

