

Spatial modelling with the R-GRASS Interface

Rainer M. Krug

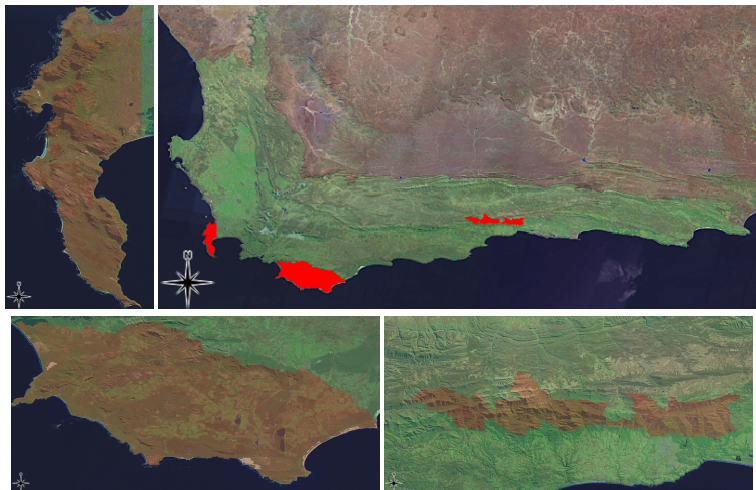
Centre of Excellence for Invasion Biology, Stellenbosch University

The R User Conference 2011 August 16-18 2011, University of
Warwick, Coventry, UK

Outline

- 1 Case Study
- 2 Usage Scenarios
 - GRASS as spatial DB
 - R as script engine
 - both combined

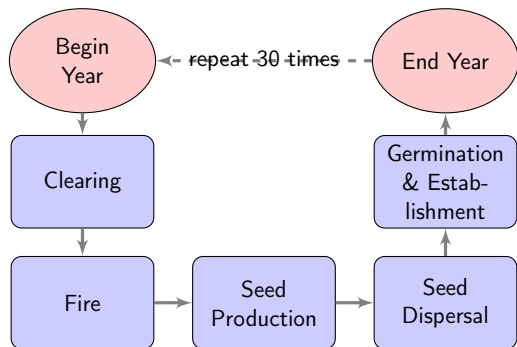
Study Area



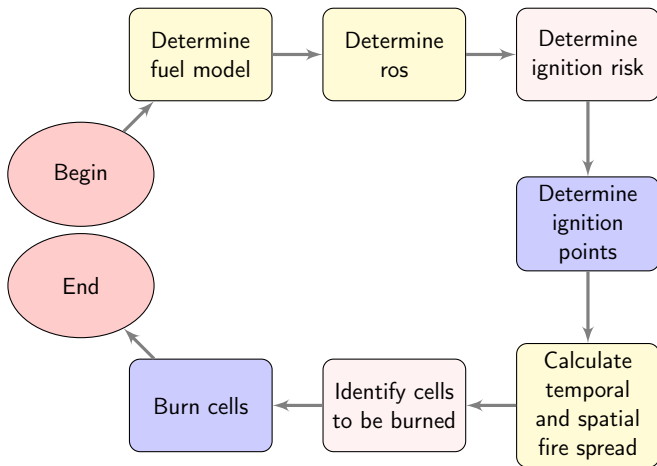
From: Krug et al. (2010). Clearing of invasive alien plants under different budget scenarios: using a simulation model to test efficiency. *Biological Invasions* 12.

Why do we worry about aliens?





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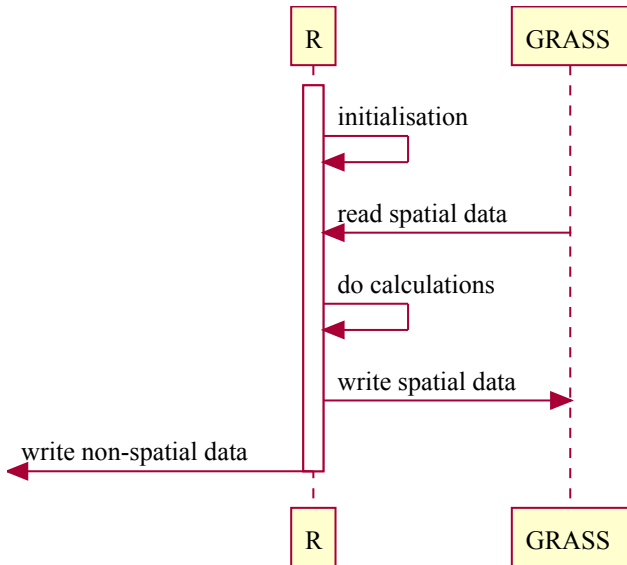
Different scenarios

- 1 GRASS as DB for spatial data
- 2 R as scripting language
- 3 Combination of both



Dave B. Wieseman

GRASS as spatial DB



Requirements

- Connect to spatial data DB
- read spatial data
- write spatial data

Packages

- spgrass6
- rgdal
- SQLiteMap
- RSAGA

Initialisation GRASS

```
1  initGRASS (  
2      gisBase   = parms(ASM)$grassPATH ,  
3      home     = tempdir() ,  
4      SG       = region ,  
5      gisDbase = paste(getwd() , "../" , sep="") ,  
6      location = "grass" ,  
7      mapset   = "AlienSpreadSim" ,  
8      override = TRUE  
9  )
```

read from GRASS

```
1 readRAST6 <- function(  
2     ...,  
3     ignore.stderr=!Debug,  
4     useGDAL=gdalGRASSenabled  
5 ) {  
6     oldWarn <- options()$warn  
7     options(warn=-1)  
8     result <- spgrass6::readRAST6(  
9         ...,  
10        ignore.stderr=ignore.stderr,  
11        useGDAL=useGDAL,  
12        plugin=FALSE  
13    )  
14    options(warn=oldWarn)  
15    return(result)  
16 }
```

Improvements

- making connection to GRASS easier and more “transparent” for user
- session wide options for reading / writing spatial data spatial commands — use options?
- “Native” interface R \iff GRASS — direct link
- primary spatial back-end for storage
- a “spatial dbi package” with different back-ends in other packages — mainly connect, read, write, delete and some query functions
- switch between different connections to spatial sources

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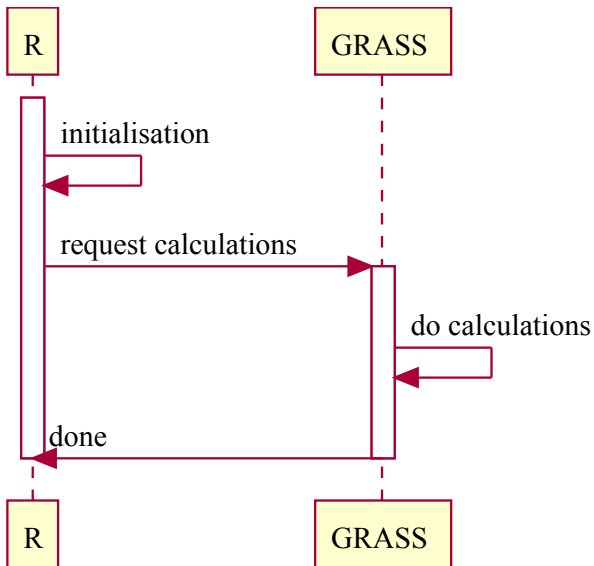
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Mahongo

R as script engine



Requirements

- Connect to GIS
- Execute commands in GIS

Packages

- spgrass6
- RSAGA
- SQLiteMap

access GRASS functions

```
1  execGRASS (  
2      cmd = "r.spread",  
3      flags = c("o"),  
4      parameters = list(  
5          max = "ros.2006.max",  
6          dir = "ros.2006.maxdir",  
7          base = "ros.2006.base",  
8          start = "ignition_2006_Points",  
9          output = "SpreadTime_2006"  
10     )  
11 ),  
12 ignore.stderr = !Debug  
13 )
```

Improvements

- implementation of `r.mapcalc` (not relevant any more for GRASS 7?)
- session wide options for executing GRASS commands — use options?
- use `...` as an alternative way of passing parameter to GRASS function?
- primary GIS backend for analysis

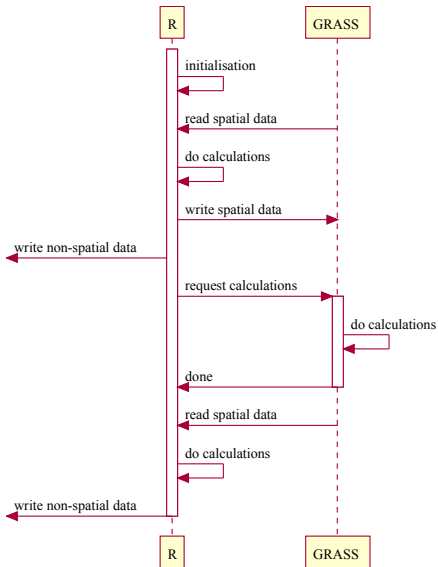
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Requirements

- Frequent data exchange R \iff GRASS
- Working with a MASK
- Easily portable to other computer (PCs, hpc, ...)

Improvements

- Increased speed in reading / writing
- Parallelization of routines (map arithmetic)

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Conclusions

- Good infrastructure for GIS work
- Room for improvements

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