

# PROGRAM R IN MAPPING OF NATIONAL PARKS

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## INTRODUCTION:

Program R and its interface RStudio have become excessively applied in ecology and environmental sciences. The program offers full support for diverse statistical and numerical analysis, but also provides a wide range of possibilities for mapping and spatial analysis, and spatial metrics. Some of the most commonly applied R packages suited for mapping are “leaflet”, “map”, “mapview”, “ggmap”, “RgoogleMaps”, etc. These packages produce either interactive or static maps, and selecting the specific package depends on the type of mapping tasks, as well as on the user's preference and fluency in R programming.

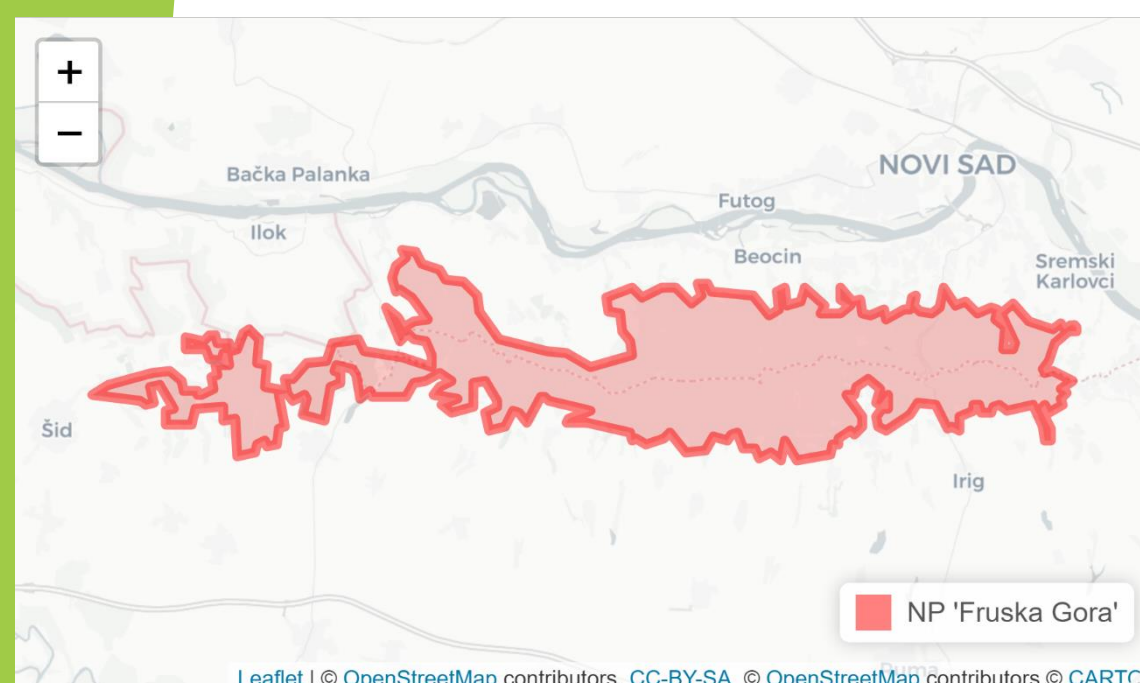


Figure 1: Fruška Gora National Park

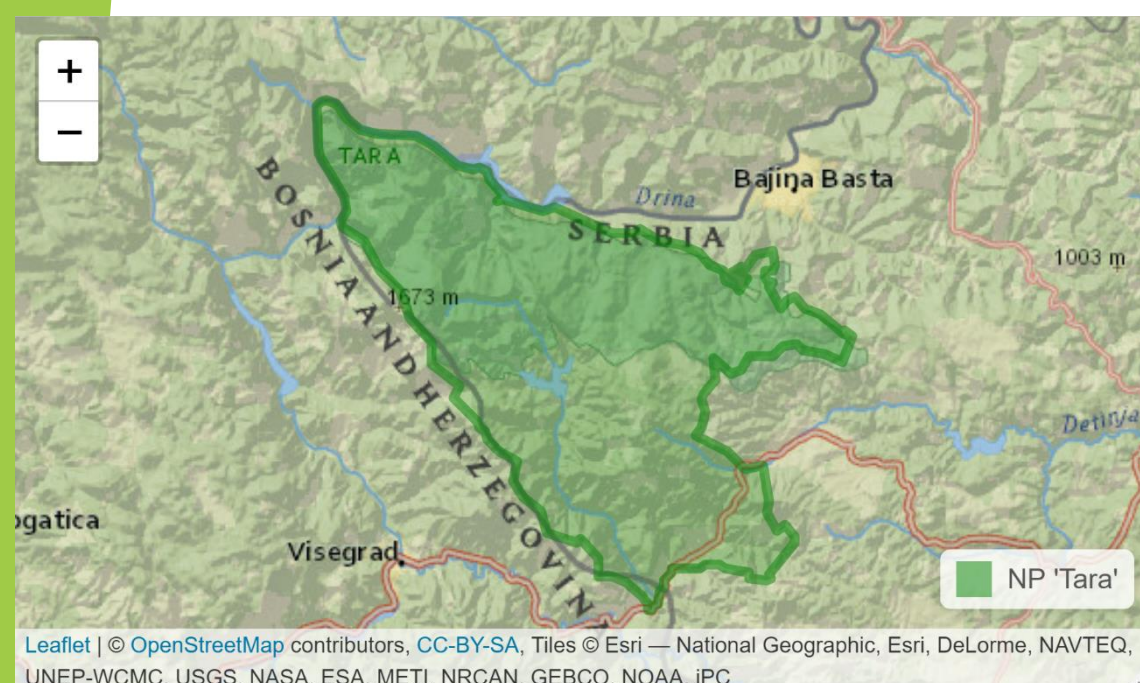


Figure 3: Tara National Park

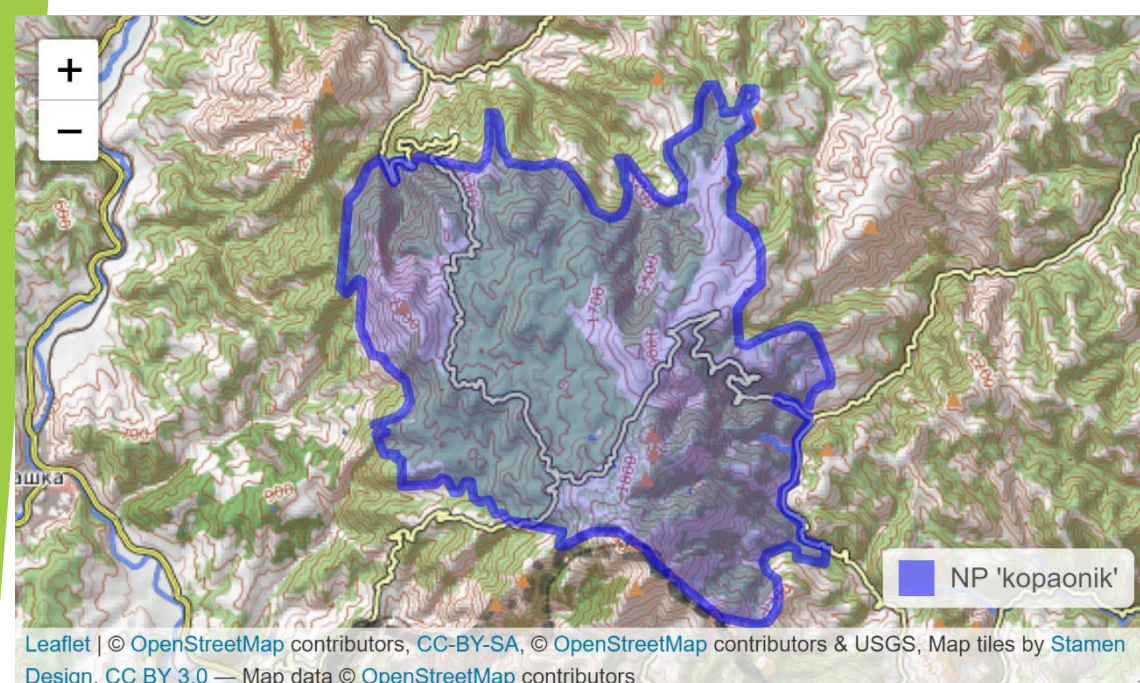


Figure 4: Kopaonik National Park

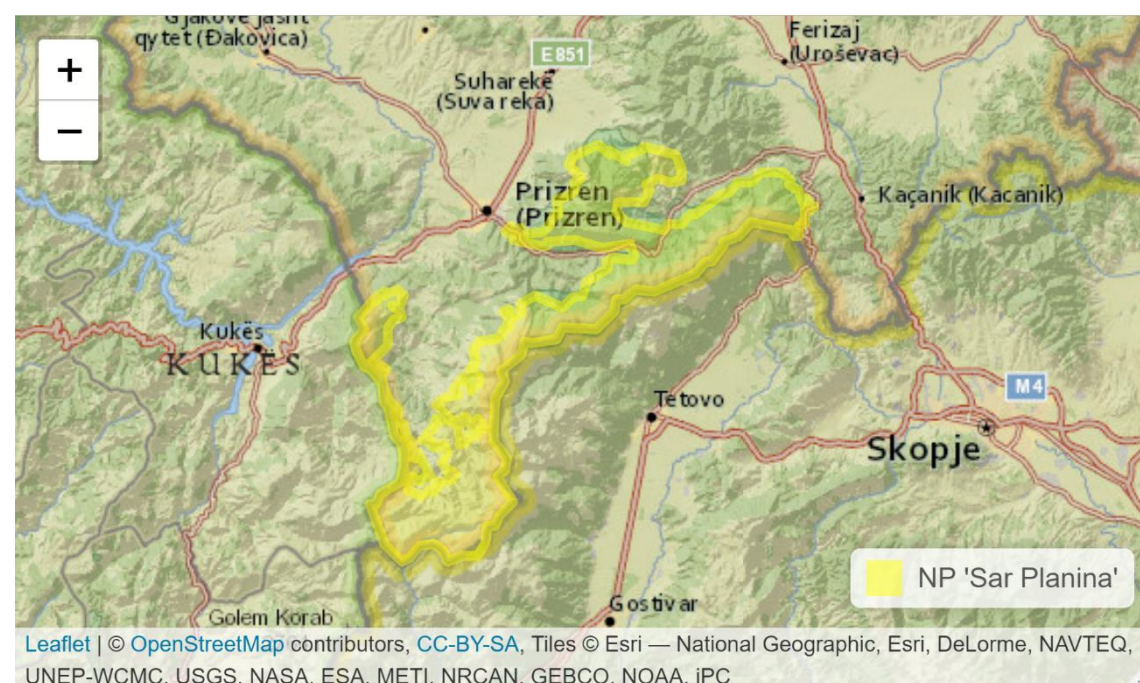


Figure 5: Šar Planina National Park

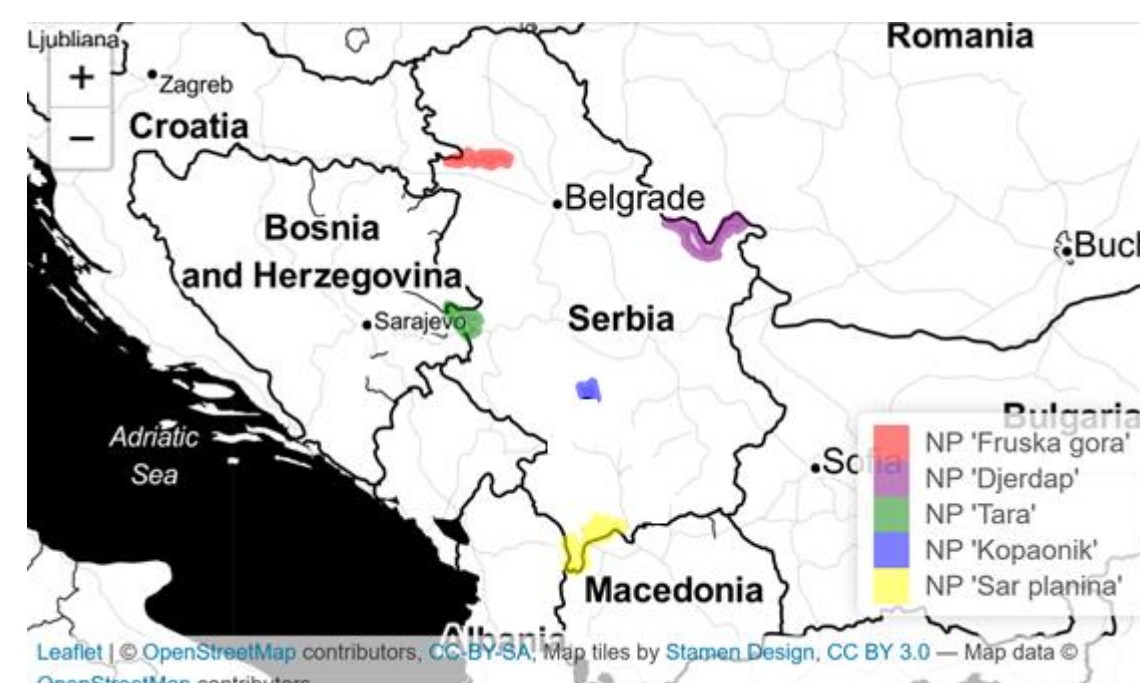


Figure 6: National Parks in Serbia

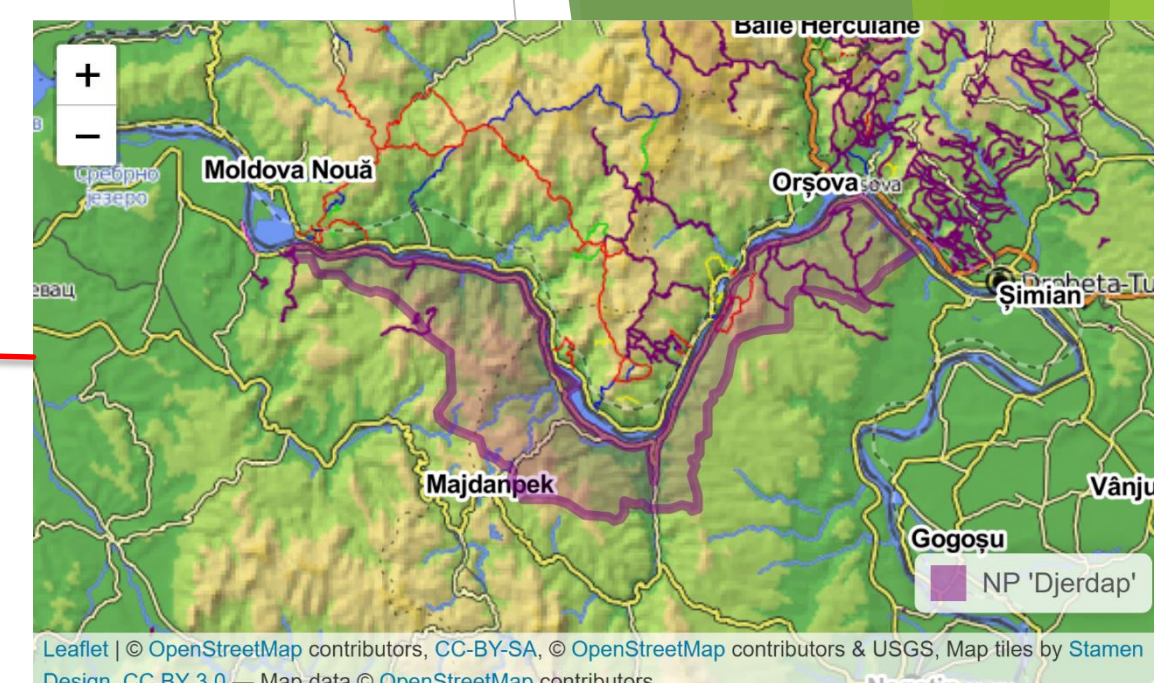
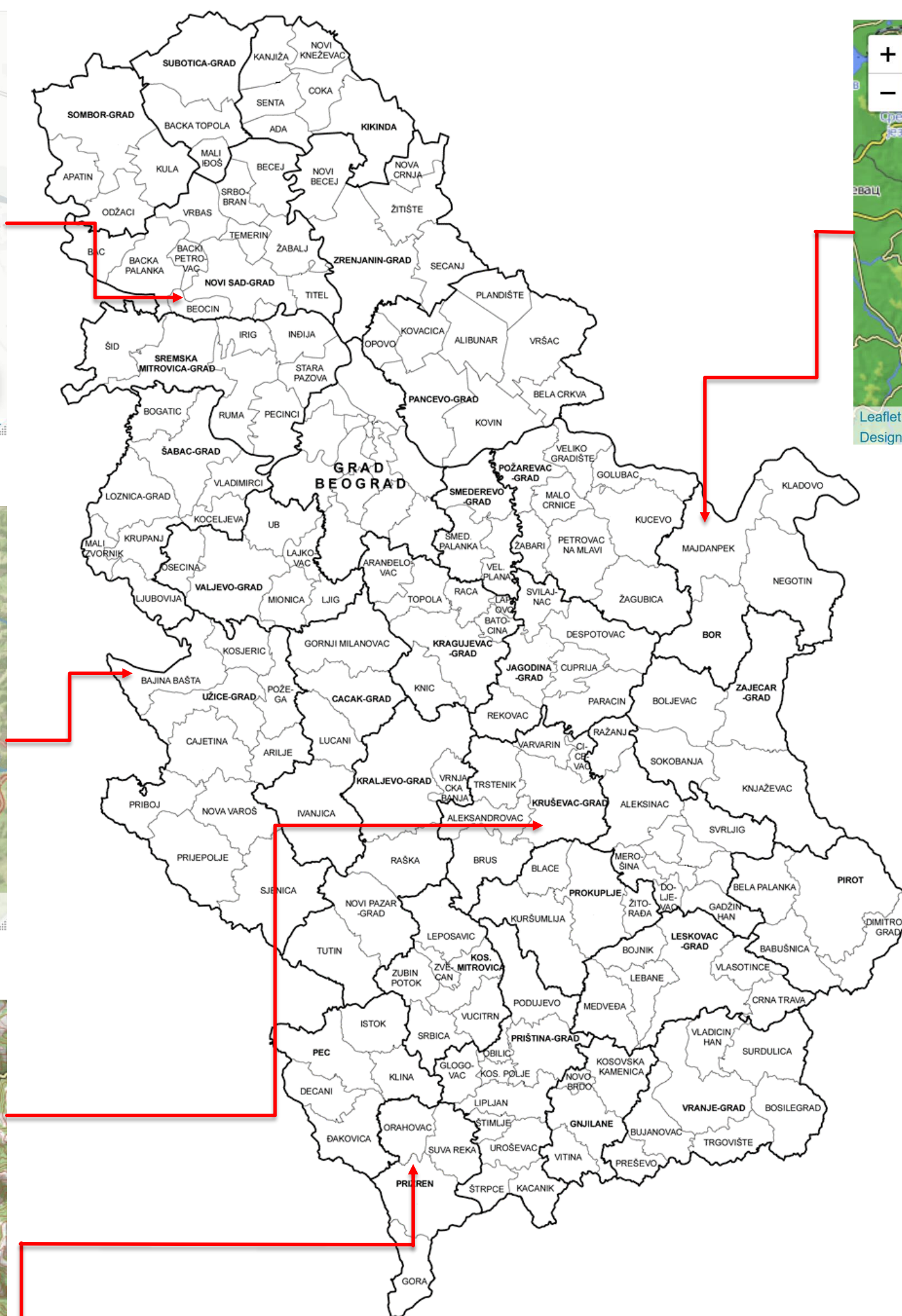


Figure 2: Djerdap National Park

## OBJECTIVES:

The main objective of this research is the mapping of national parks in Serbia using the R package “leaflet”, as one of the packages that do not require high fluency in R. The package produces interactive maps that could be additionally zoomed in or zoomed out. Mastering this package can be a useful introduction to more advanced R packages. Therefore, the secondary objective of the paper is to provide an overview of other R packages that could be suitable for mapping and spatial analysis of protected areas. The mapping of protected areas is crucial from the perspective of defining adaptive management plans and conserving natural values within, and this paper aims to show a procedure that supports the mapping process in these terms.

## METHOD / DESIGN:

For mapping purposes, we have used the “leaflet” package within the R program (version 3.5.1) and RStudio (version 1.1.463). R is free software, as well as RStudio and the “leaflet” package, and that gives this procedure a fair advantage in comparison to the other mapping methods and techniques. Creating maps of five national parks in Serbia: NP “Fruška gora”, NP “Djerdap”, NP “Tara”, NP “Kopaonik”, and NP “Sar planina” has been set as a mapping assignment.

## RESULTS:

There were six maps created in total: five maps for each of the national parks separately (NP “Fruška gora”, NP “Djerdap”, NP “Tara”, NP “Kopaonik” and NP “Sar planina”) and one map containing previews of all national parks together. Maps presenting a single national park are being set in a narrow spatial context – encompassing a small portion of the surrounding area, while a final map presents all national parks on the map of the Republic of Serbia. This section provides a brief explanation below each map, related to the size of the protected area, year of the proclamation of the zone as a national park, characteristics of local flora, etc.

## CONCLUSIONS:

Contemporary computer tools allow easy procedure of creating maps. Nowadays, program R with its supporting packages is one of the most prominent computer tools. When the coordinates of a certain area are being known, it is an easy task to import them in the R environment and work over them using one (or more) available packages. For users encountering the R for the first time, we recommend starting with the “leaflet” package. The syntax necessary for this package is easily understandable and straightforward and allows creating different types of maps in a short time notice. This procedure is relevant for the mapping of protected natural areas, such as national parks in Serbia presented in the paper. Creating different types of maps in R is very useful when defining adaptive management plans and conservation strategies for natural assets within protected areas.