



ФАКУЛТЕТ ЗА  
ШУМАРСКИ НАУКИ,  
ПЕЈЗАЖНА АРХИТЕКТУРА  
И ЕКОИНЖЕНЕРИНГ  
„ХАНС ЕМ“

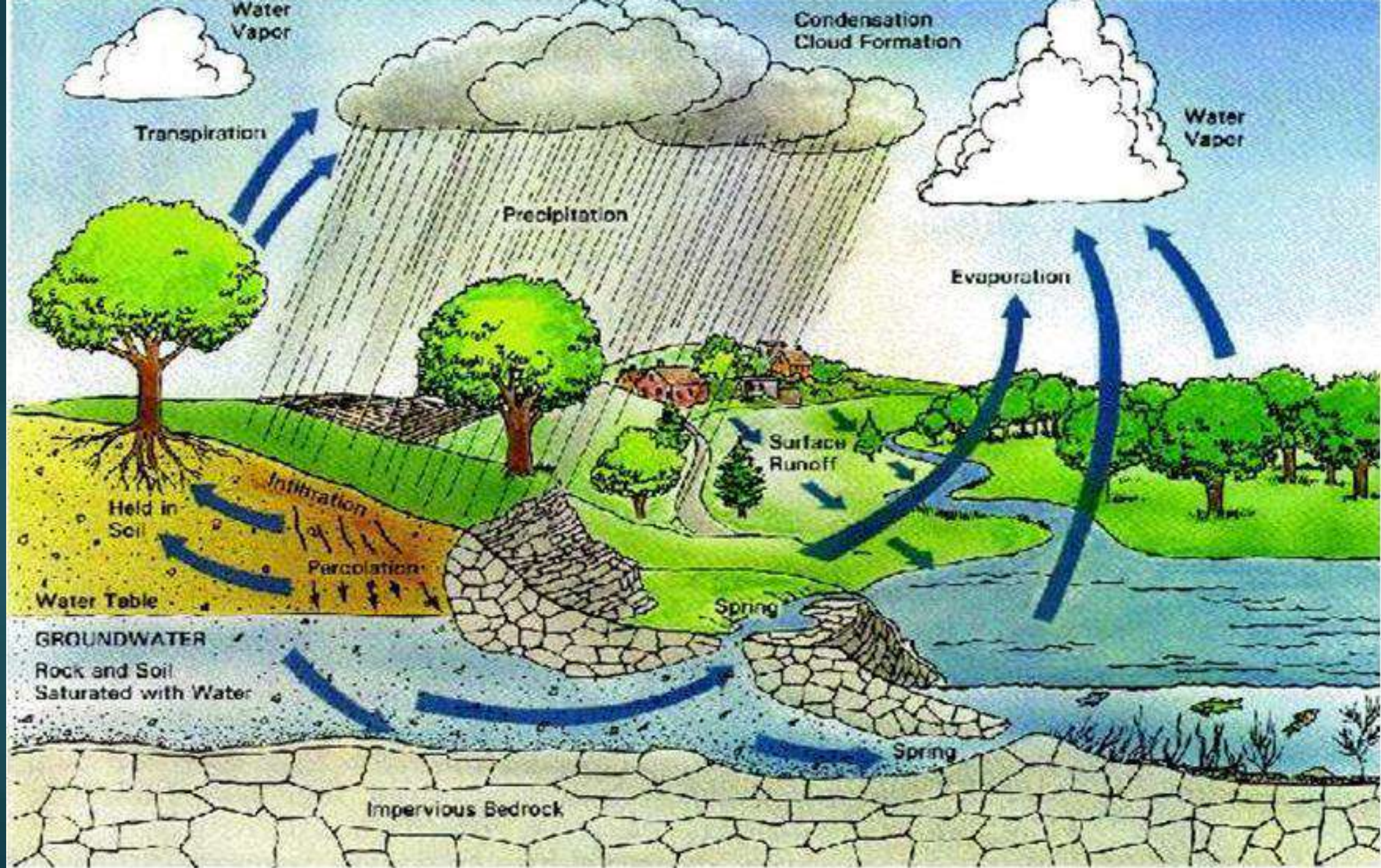


# “Identifying runoff sensitivity in forests and seminatural areas; Case study: Skopska Crna Gora”

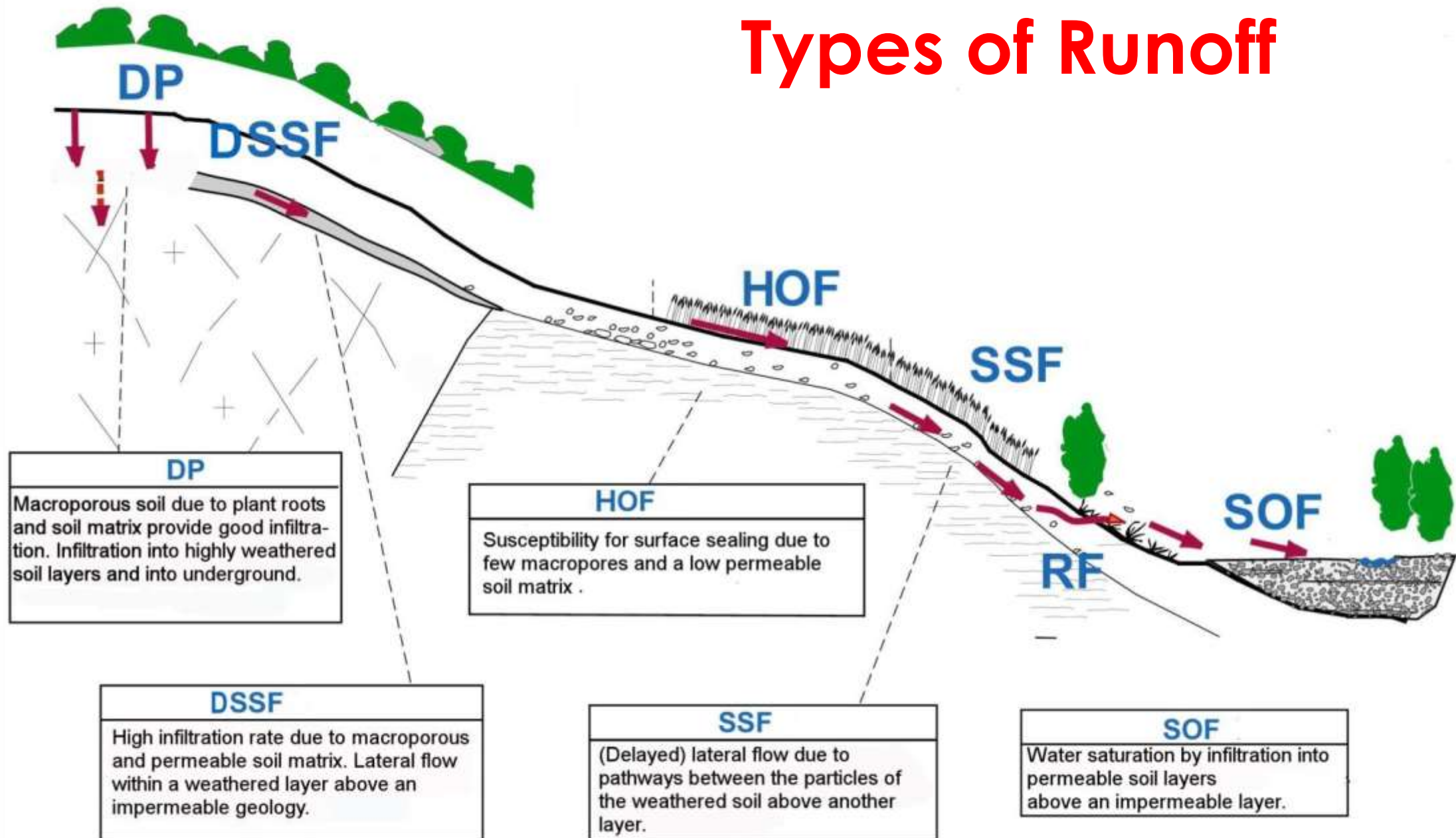
Ivan Blinkov<sup>1</sup>, Gebhard Schüler<sup>2</sup>, Ivan Minchev<sup>1</sup>, Bozhin  
Trendafilov<sup>1</sup>, Aleksandar Trendafilov<sup>1</sup>

- ▶ <sup>1</sup>Hans Em Faculty of Forest Sciences, Landscape Architecture and Environmental Engineering, Ss. Cyril and Methodius University in Skopje, Skopje, Republic of North Macedonia
- ▶ <sup>2</sup>Forschungsanstalt für Waldökologie und Forstwirtschaft Rheinland-Pfalz, Zentralstelle der Forstverwaltung, Trippstadt, Germany

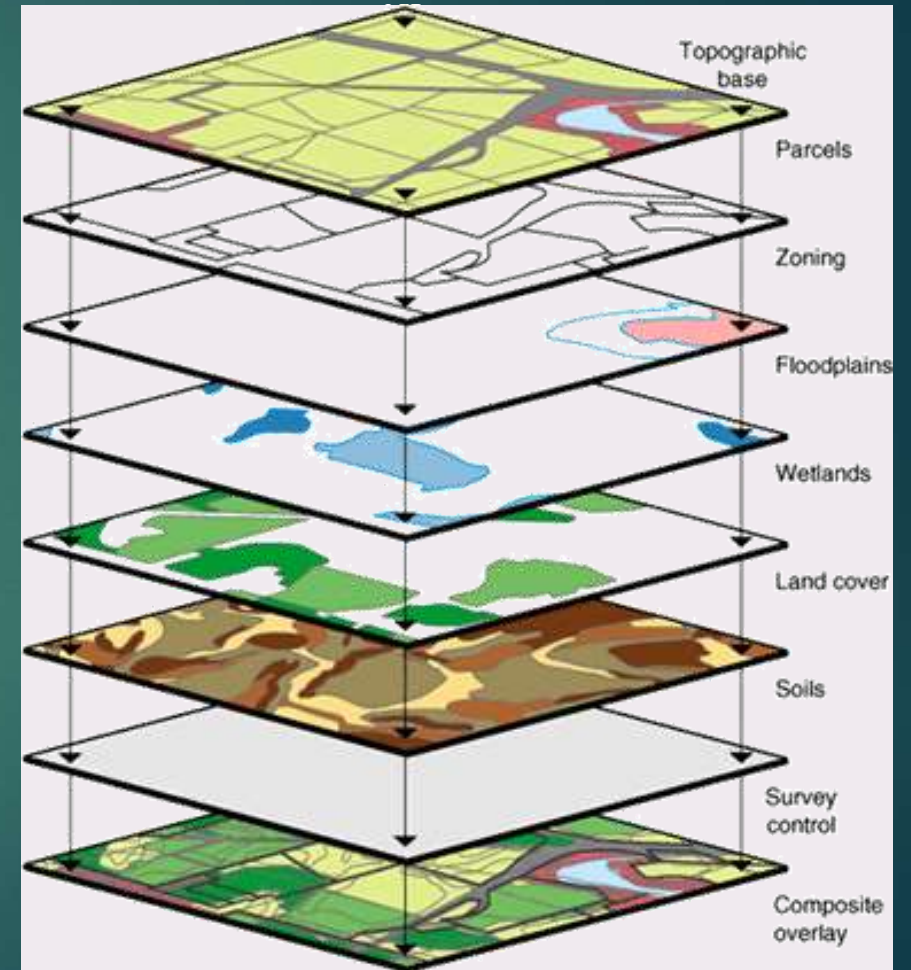
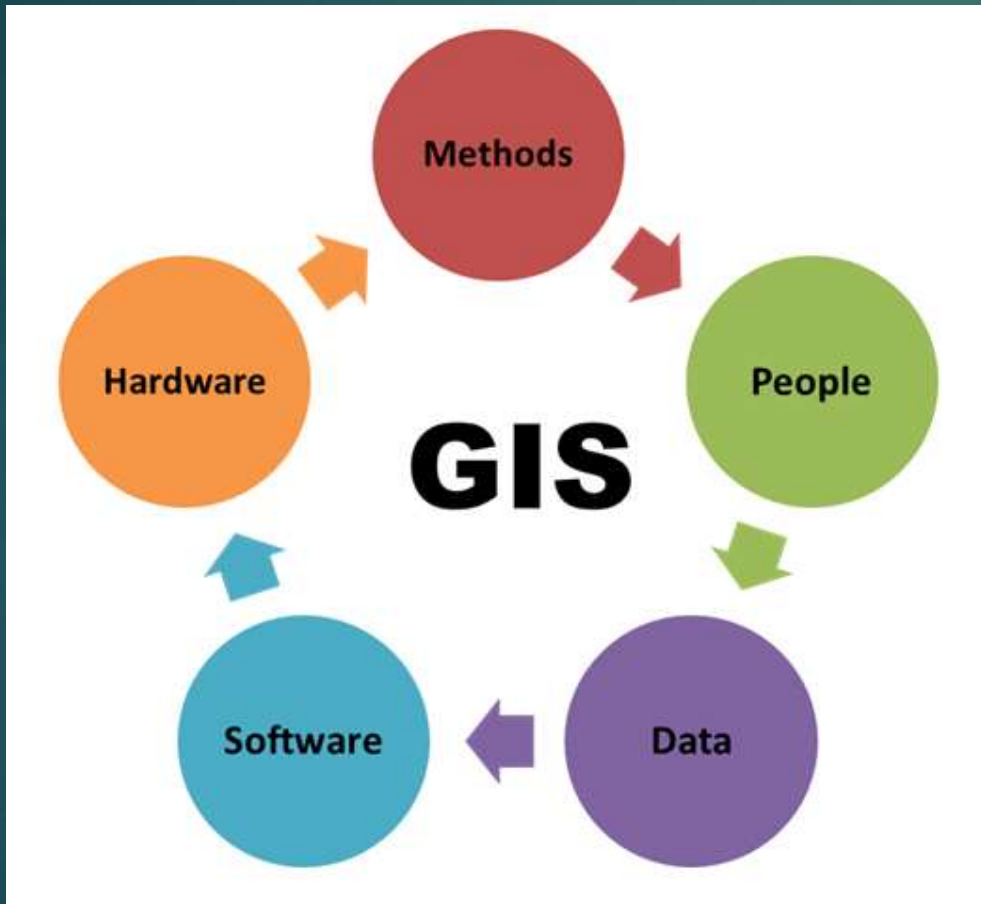
75th Anniversary of the Hans Em Faculty of Forest Sciences, Landscape Architecture and Environmental Engineering (HEF),  
The international scientific conference “Better forestry, for better forests, for a better planet”,  
June 15th-16th, 2022 in Skopje, Republic of North Macedonia



# Types of Runoff



# GIS – Geographic information system



# Existing GIS databases

- ▶ Soil map
- ▶ Geology map
- ▶ Forest management maps; Map of forest roads
- ▶ Satellite / aerial imagery
- ▶ Digital elevation model (DEM) / Countours
- ▶ Erosion map
- ▶ Hydrographic network
- ▶ Settlements ....

# Soil map

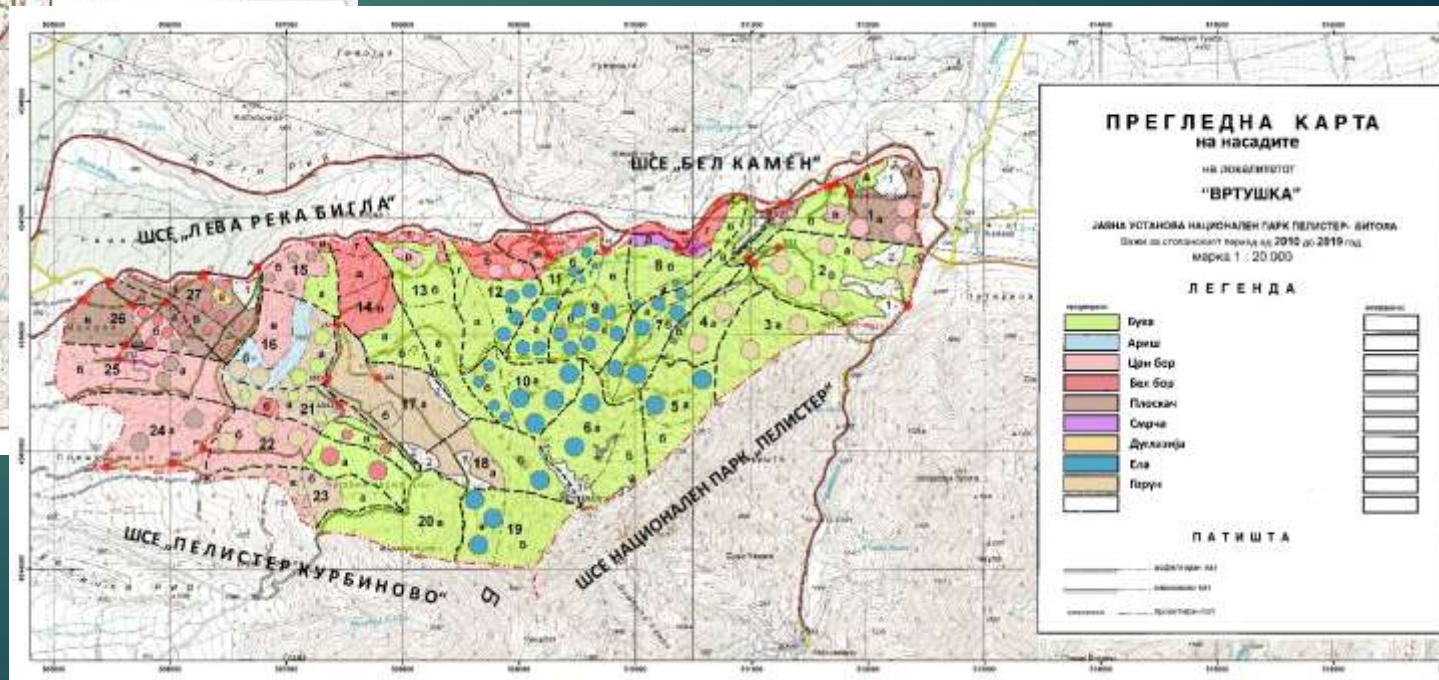
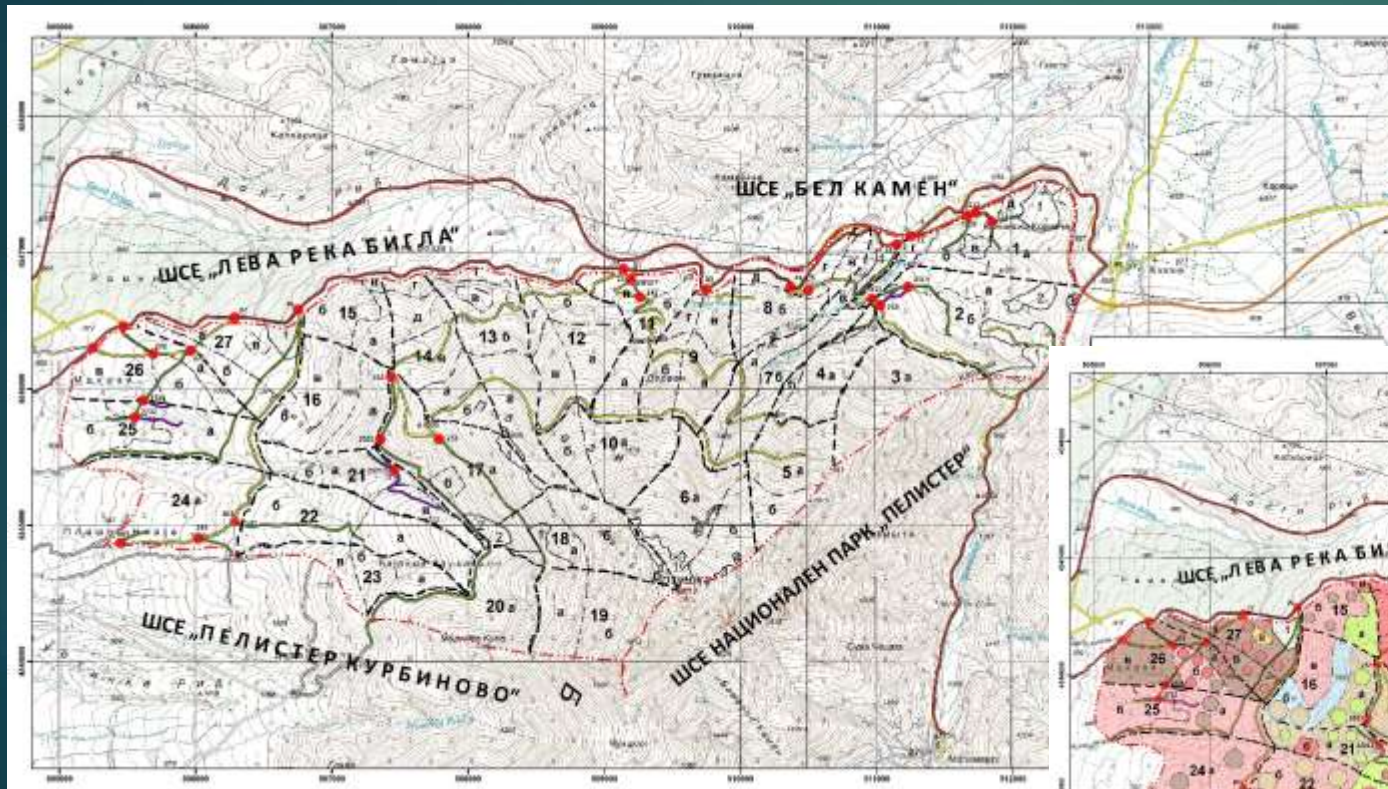
The screenshot displays the MASIS (Macedonian Soil Information System) web application. The browser address bar shows the URL [www.maksoil.ukim.mk/masis/](http://www.maksoil.ukim.mk/masis/). The page header includes the title "Македонски почвен информативен систем" (Macedonian Soil Information System) and logos for the University "St. Kiril i Metodij", the Faculty of Agriculture, Food and Forestry, and the Ministry of Agriculture, Forestry and Water Management. It also features the "2015 International Year of Soils" logo and navigation links for "Најави се" (Log in) and "Контакт" (Contact).

The main content area shows a detailed soil map of North Macedonia, color-coded by soil type. A left-hand menu provides various interactive tools: "Словен" (Legend), "Легенда" (Legend), "Идентификација" (Identification), "Поврзани табели" (Linked tables), "Напредно пребарување" (Advanced search), "Мерење" (Measurement), "Цртање" (Drawing), "Печати" (Print), and "Clip Zip Ship" (Export). A "Подлоги" (Layers) control is visible in the top right of the map area.

At the bottom of the map, there is a scale bar indicating 30 km and a coordinate string: 1:1,000,000 4677308.227 7433884.306. The Esri logo and copyright notice "© МПИС 2015" are located in the bottom right corner.

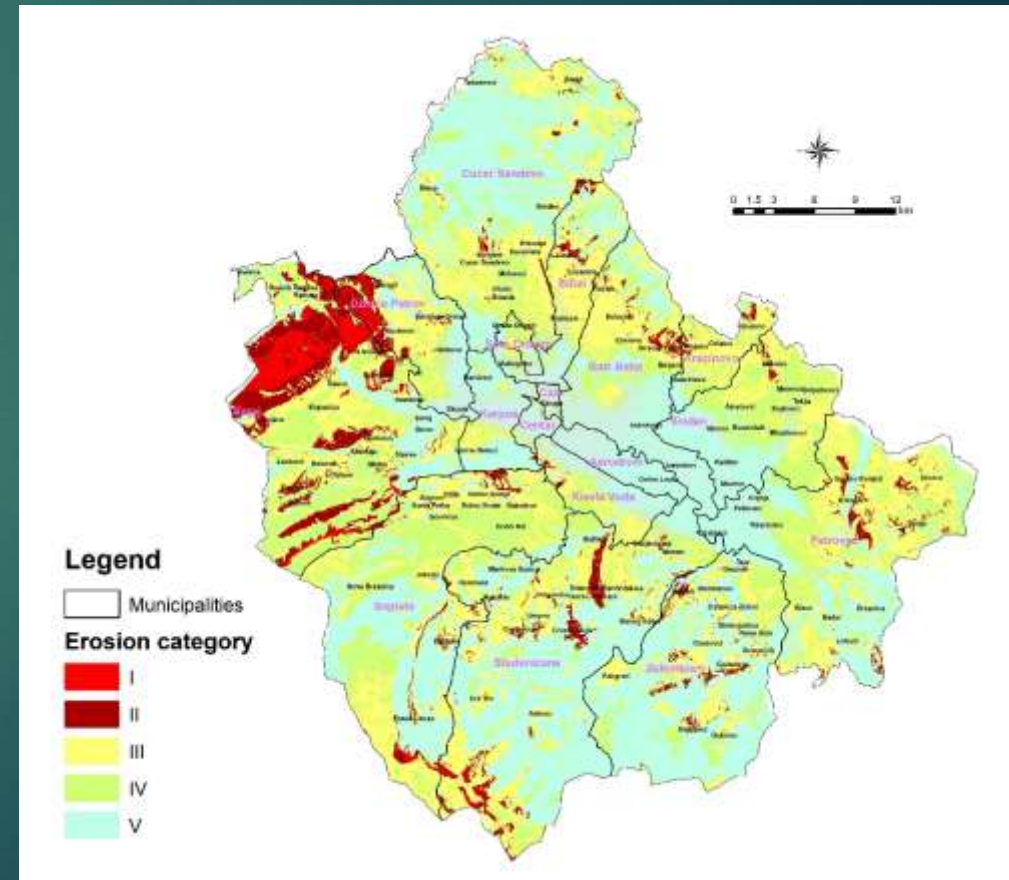
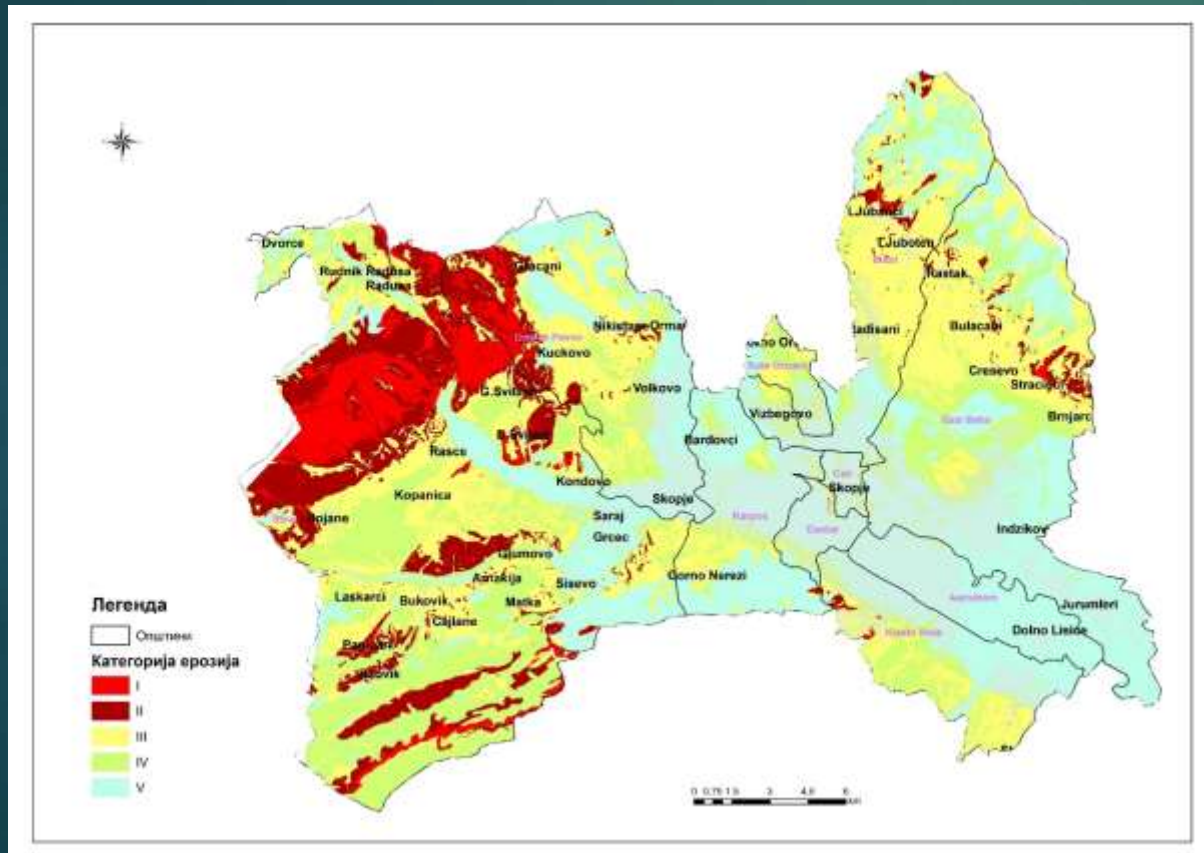


# Forest management maps





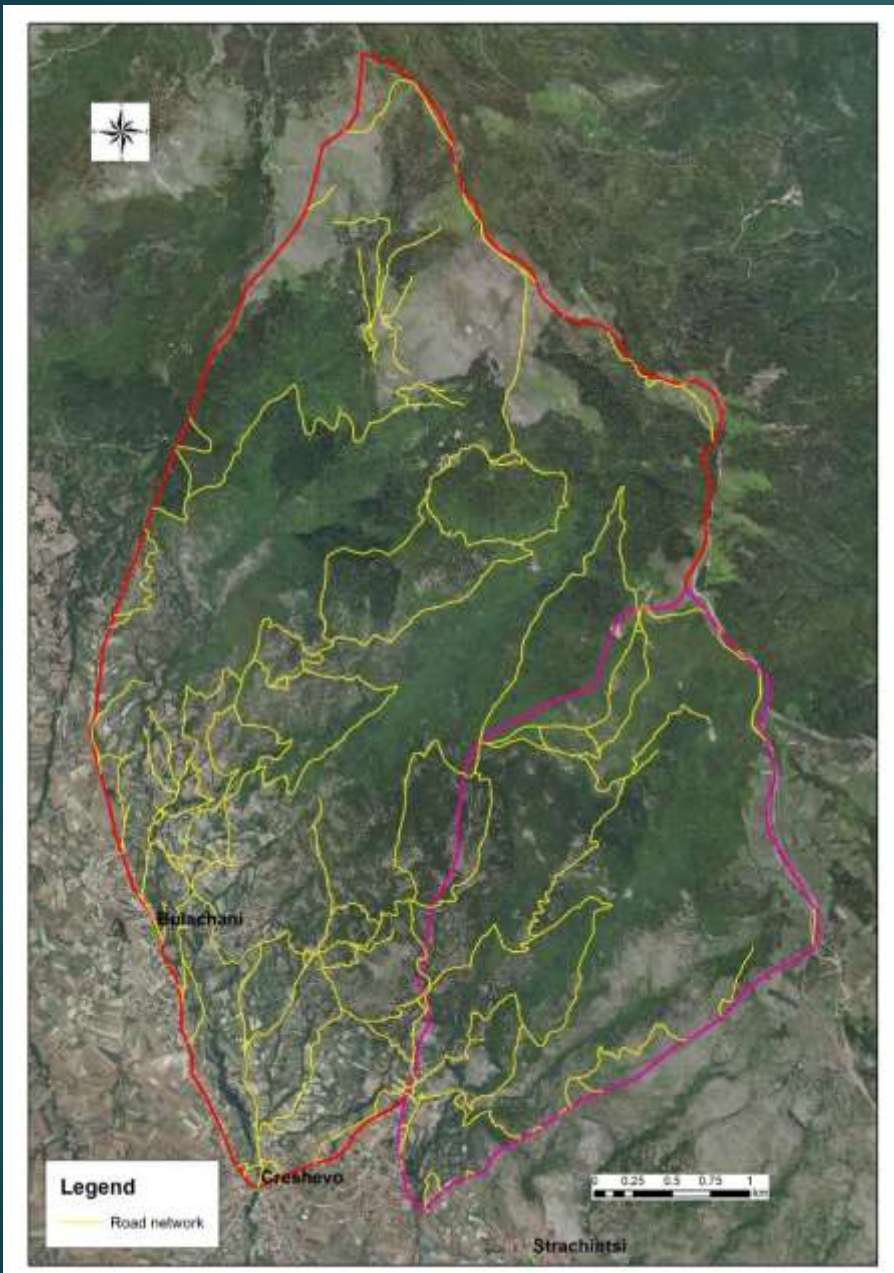
# Erosion map



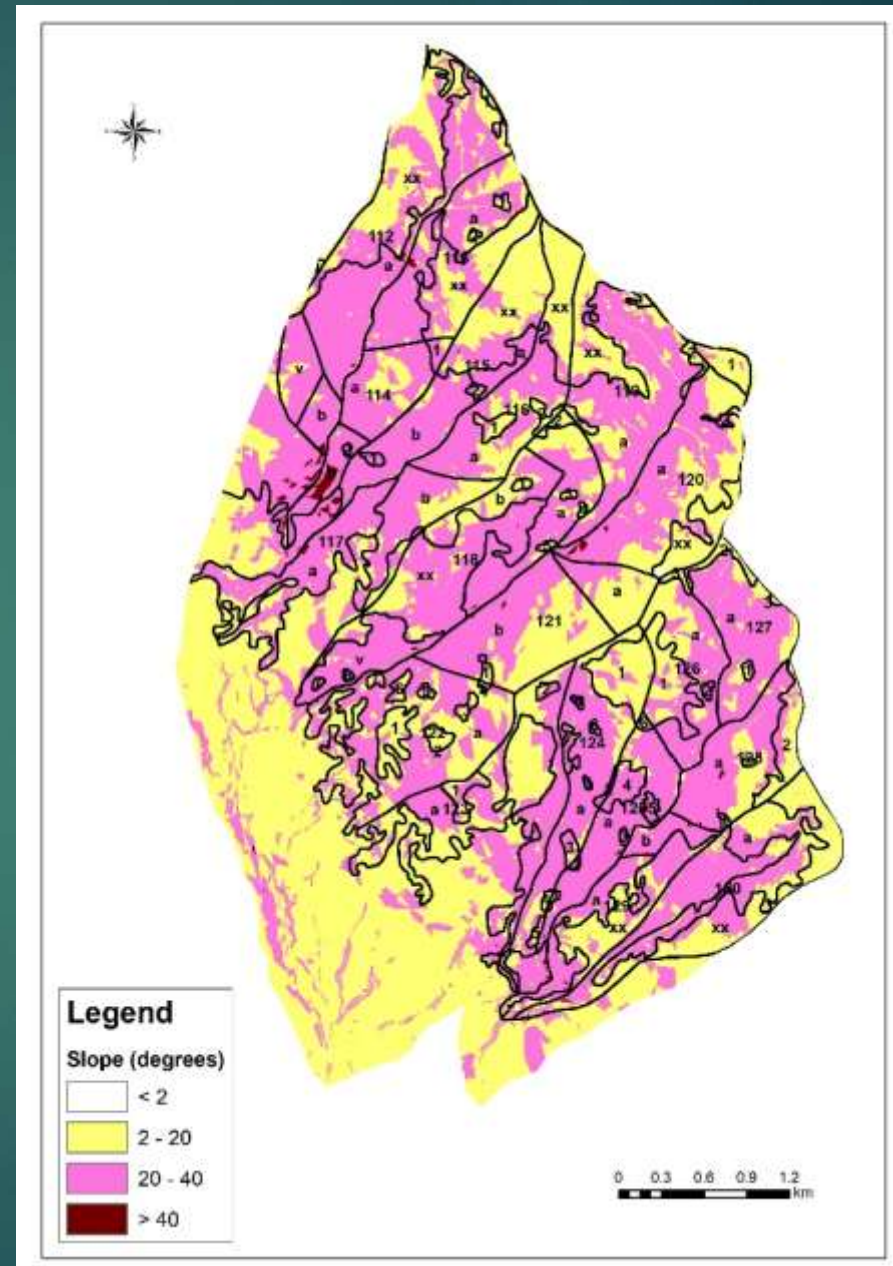
# GIS layers for the area of interest

- ▶ Soil map
- ▶ Geology map
- ▶ Forest management maps;
- ▶ Map of forest roads
- ▶ Satellite / aerial imagery
- ▶ Digital elevation model (DEM) / Contours

## Existing roads

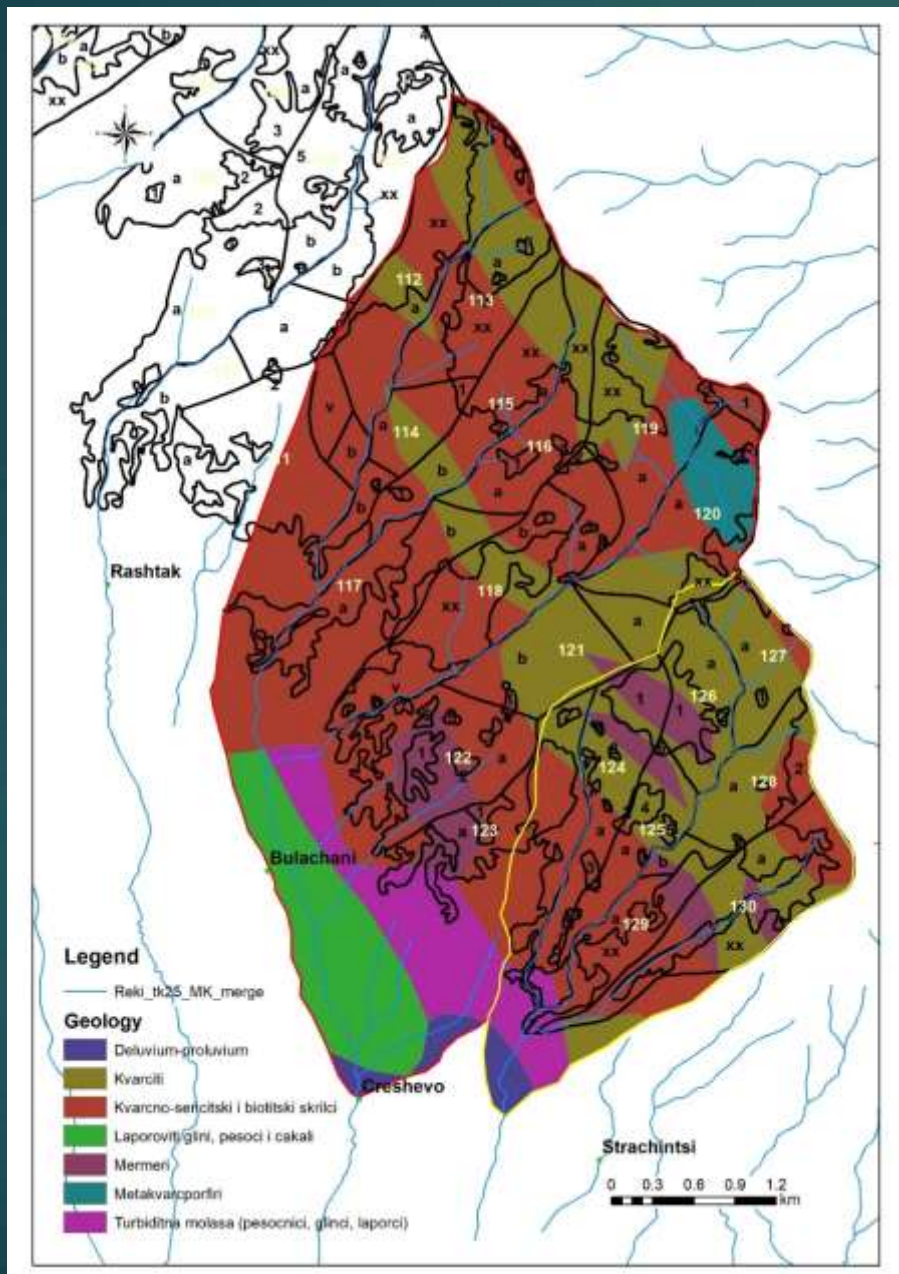


## Slope

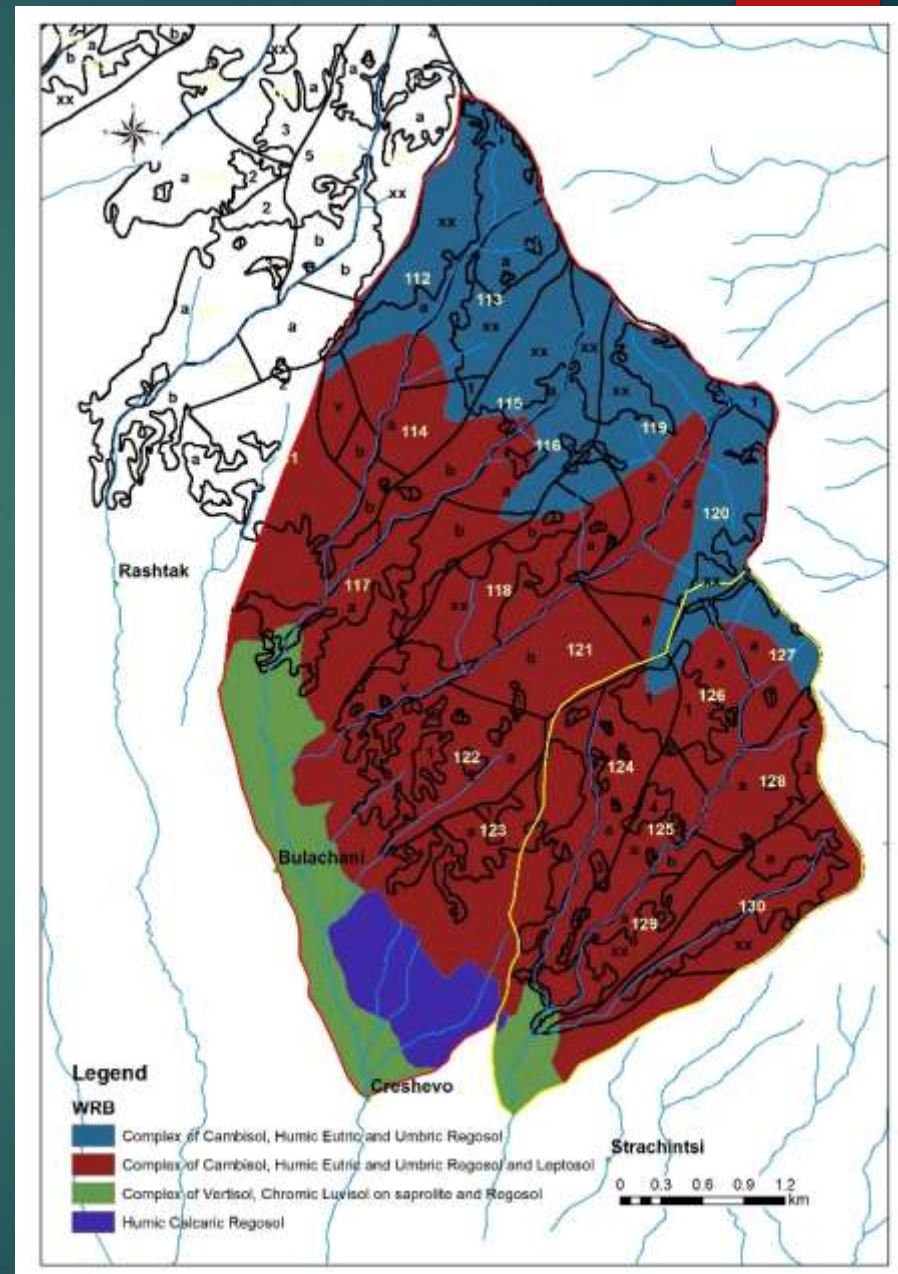




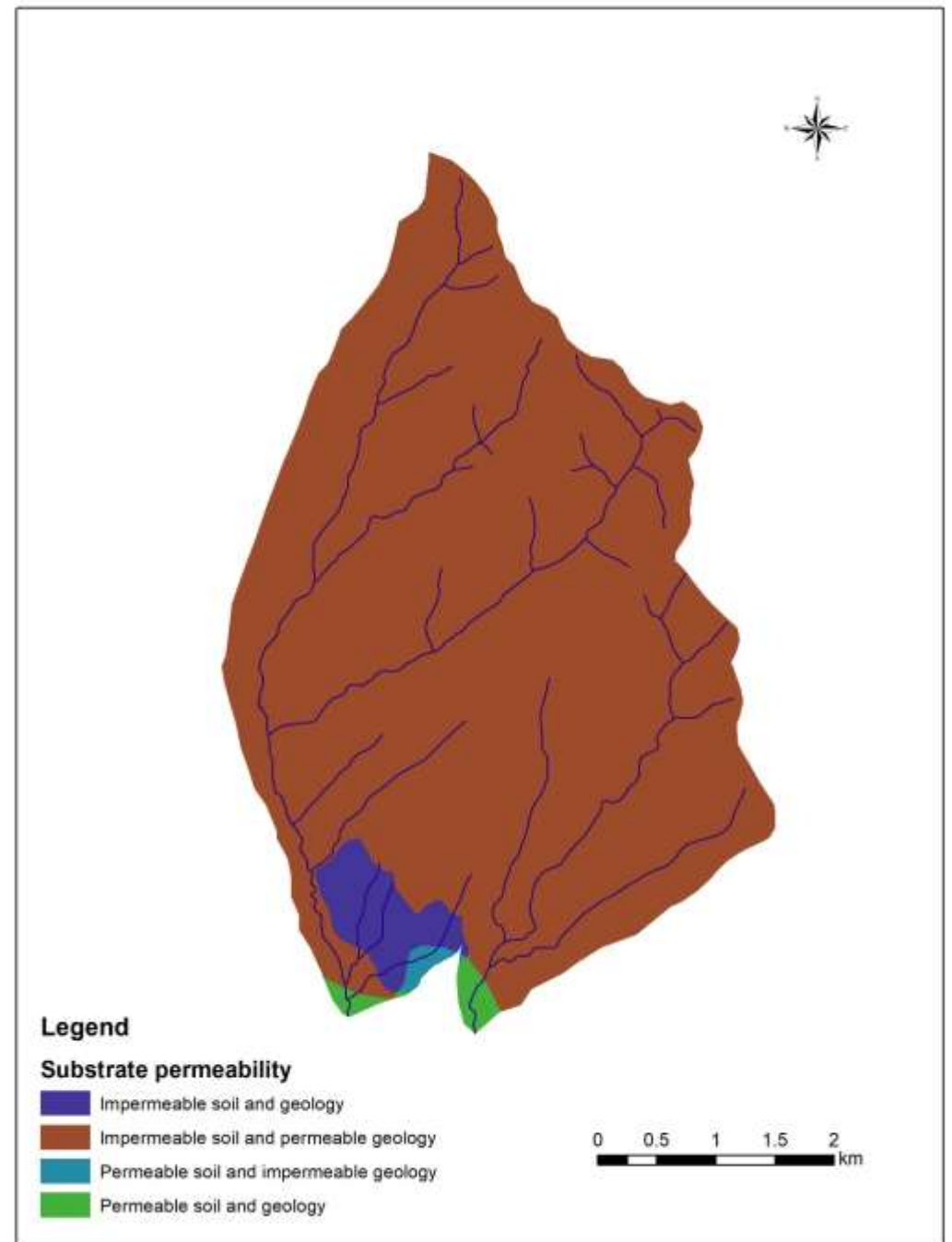
# Geology map



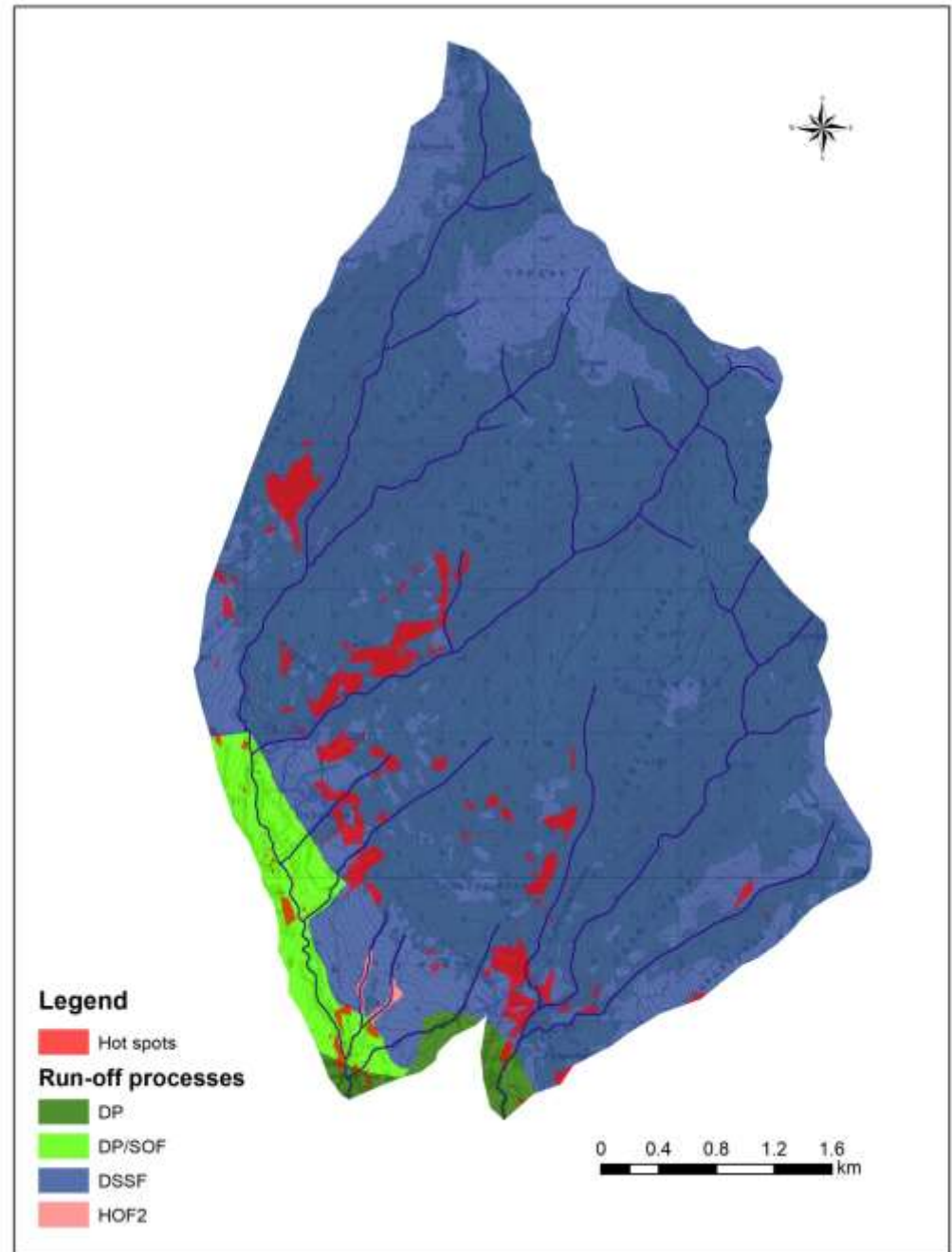
# Soil map



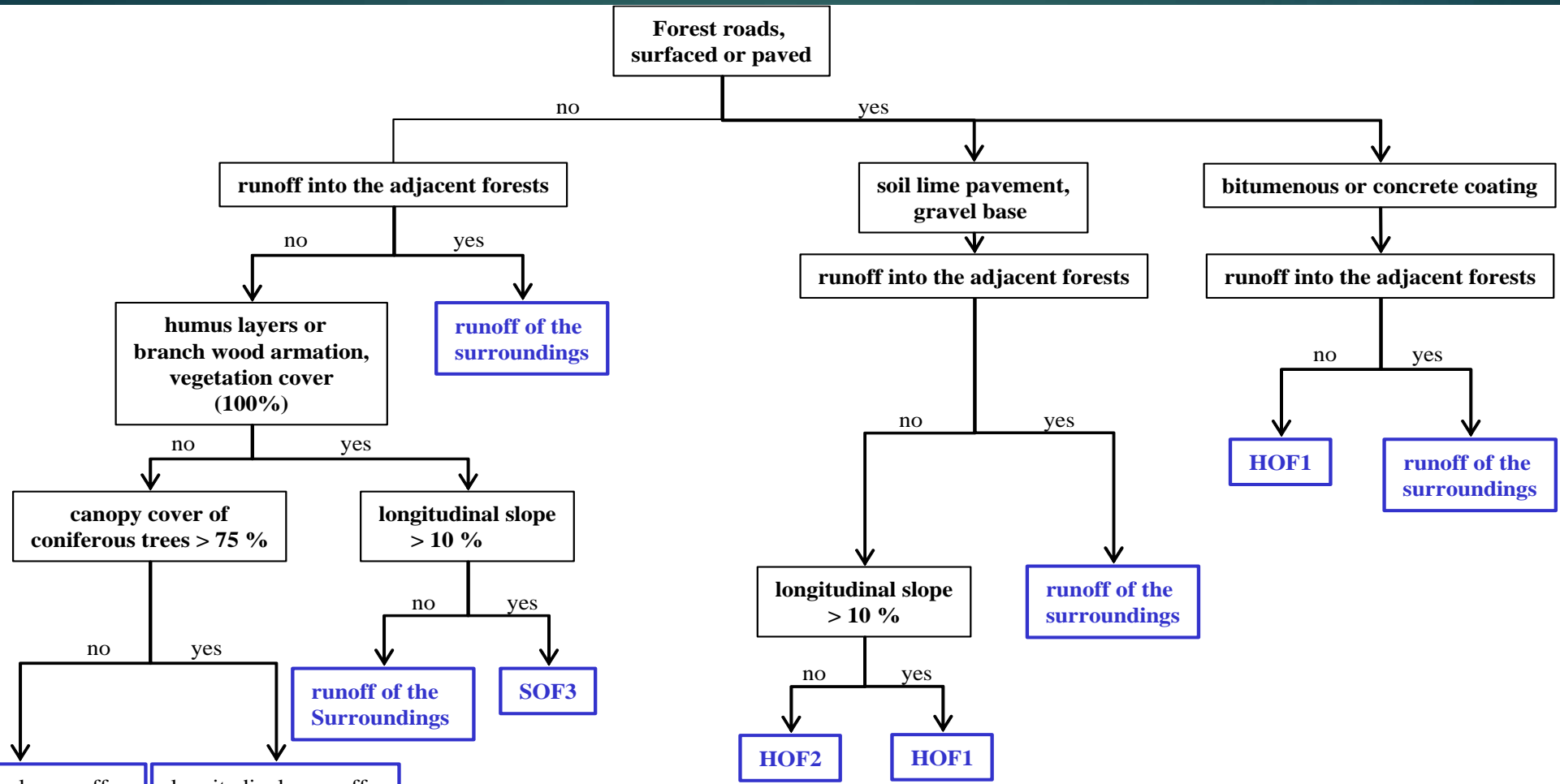
# Substrate permeability



# Runoff processes



# Expert system for forest road assessment

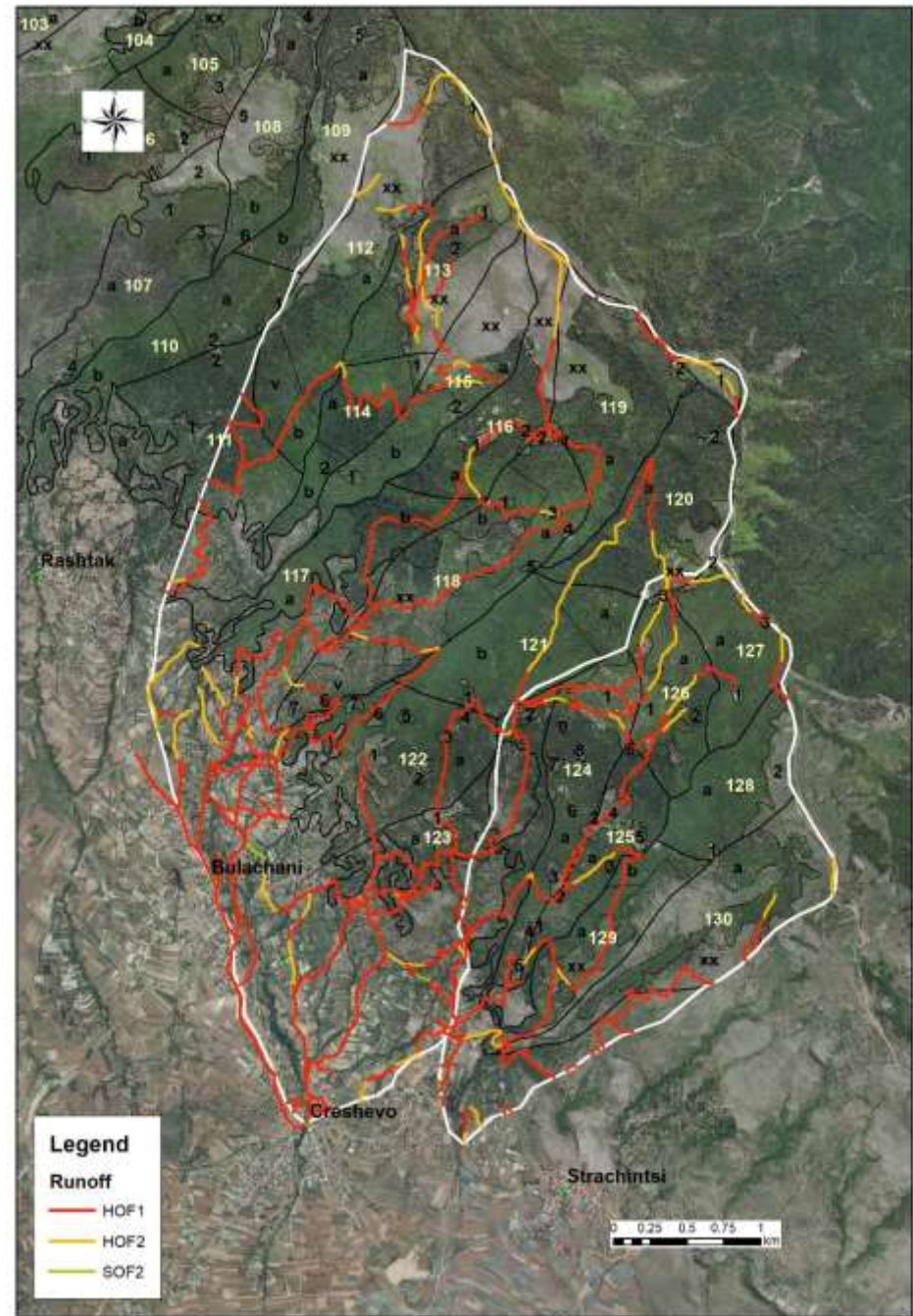


longitudinal slope < 3%	runoff process SOF3 *	longitudinal slope < 3%	runoff process SOF3 *
3 - 5%	SOF2 *	3 - 5%	SOF2 *
5 - 10%	HOF2	5 - 10%	SOF2*
> 10%	HOF1	> 10%	HOF2

* =	sand	loamy sand, sandy loam, silt loam	silt	clay, clay loam, loamy clay
runoff velocity	delayed about one level	/	accelerated about one level	accelerated about more than one level



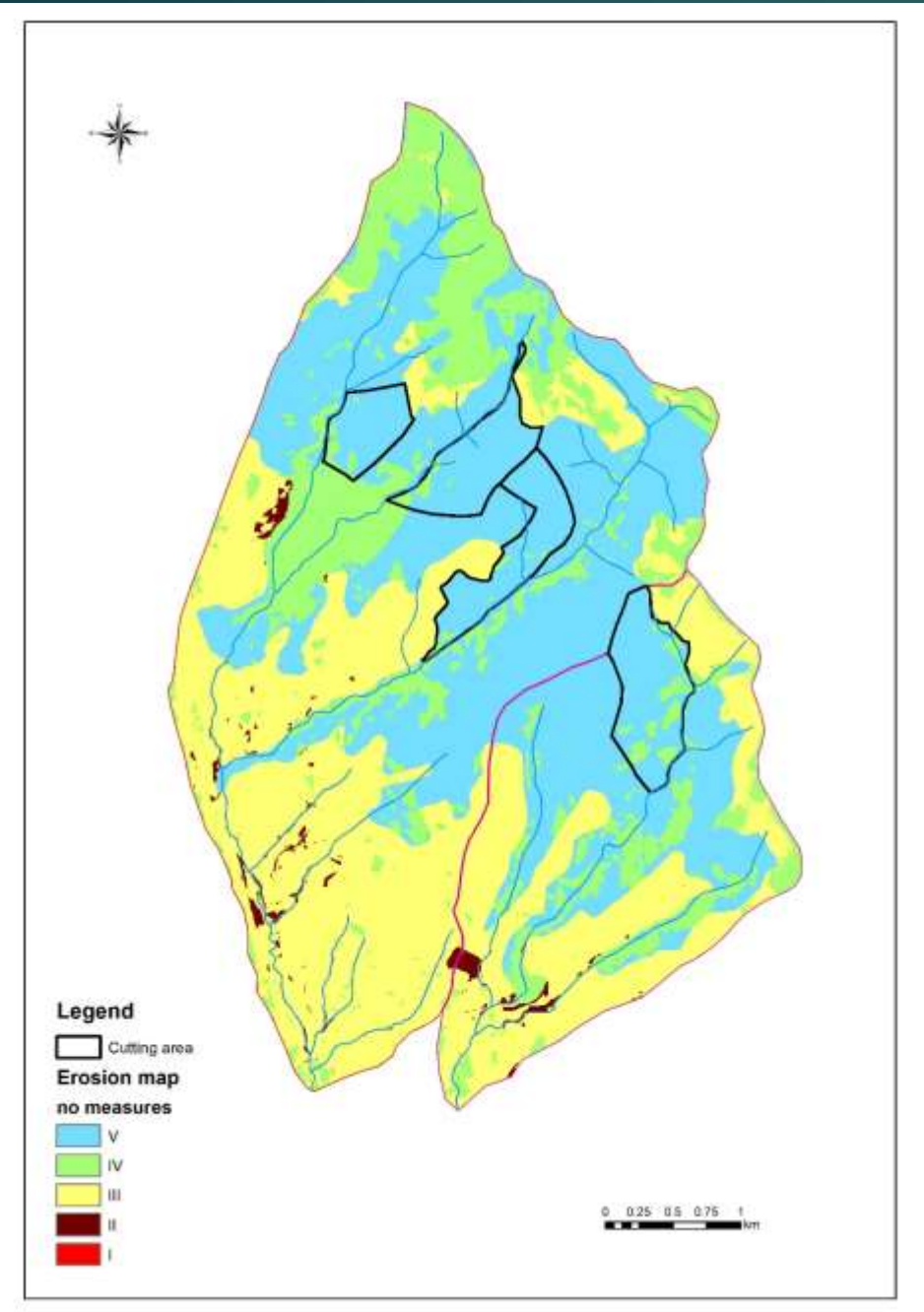
# Runoff on forest roads



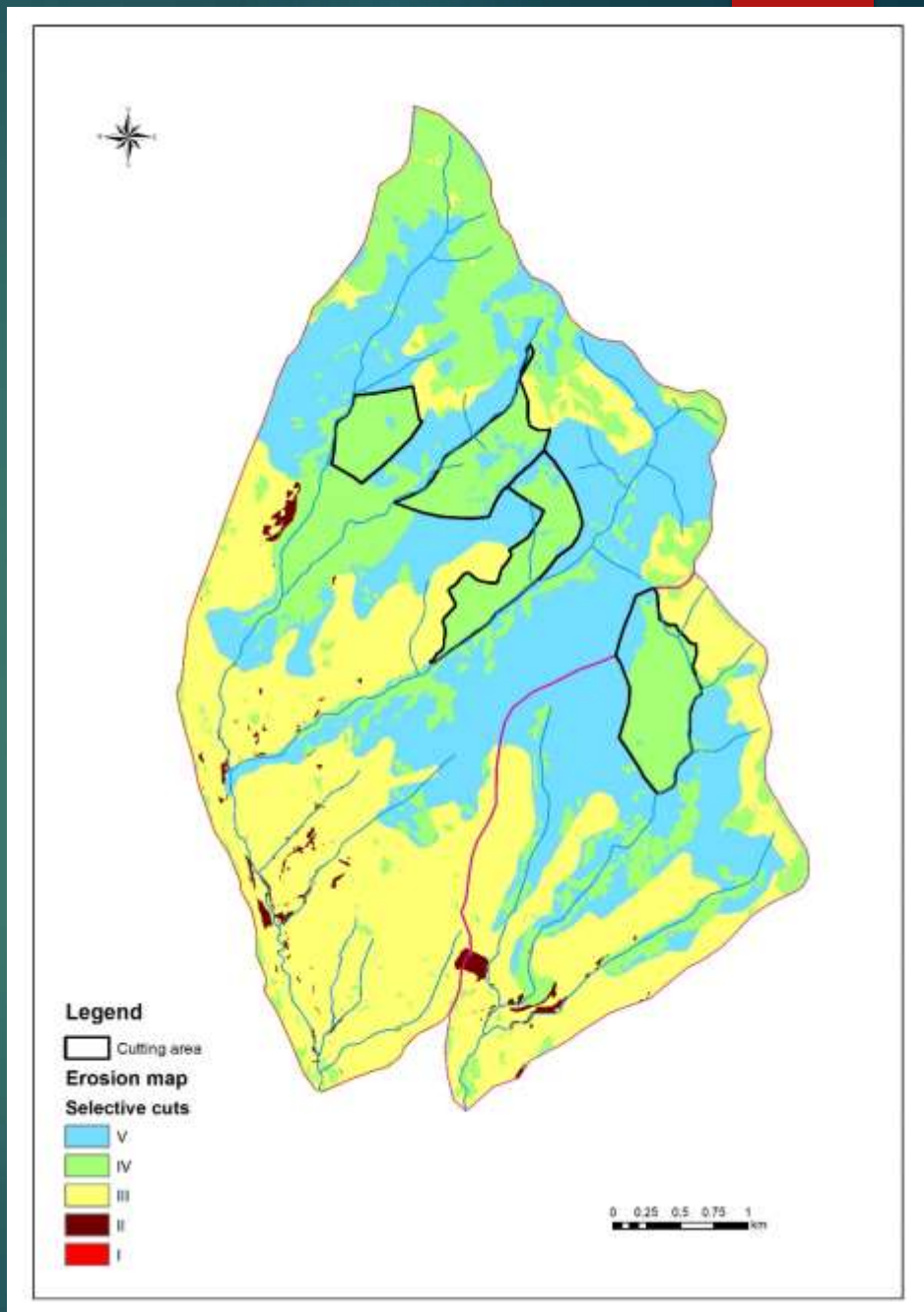
# Forest practices and risk of erosion processes

<b>Hydrological element</b>	<b>Selective Cut</b>	<b>Shelterwood Cut</b>	<b>Clear Cut</b>
<b>Interception in crown (% of total precipitation)</b>	<b>8</b>	<b>5</b>	<b>0</b>
<b>Part of precipitation remaining in the forest floor (%)</b>	<b>10</b>	<b>7</b>	<b>4</b>
<b>Infiltration (%)</b>	<b>76</b>	<b>63</b>	<b>53</b>
<b>Surface runoff (%)</b>	<b>6</b>	<b>25</b>	<b>43</b>

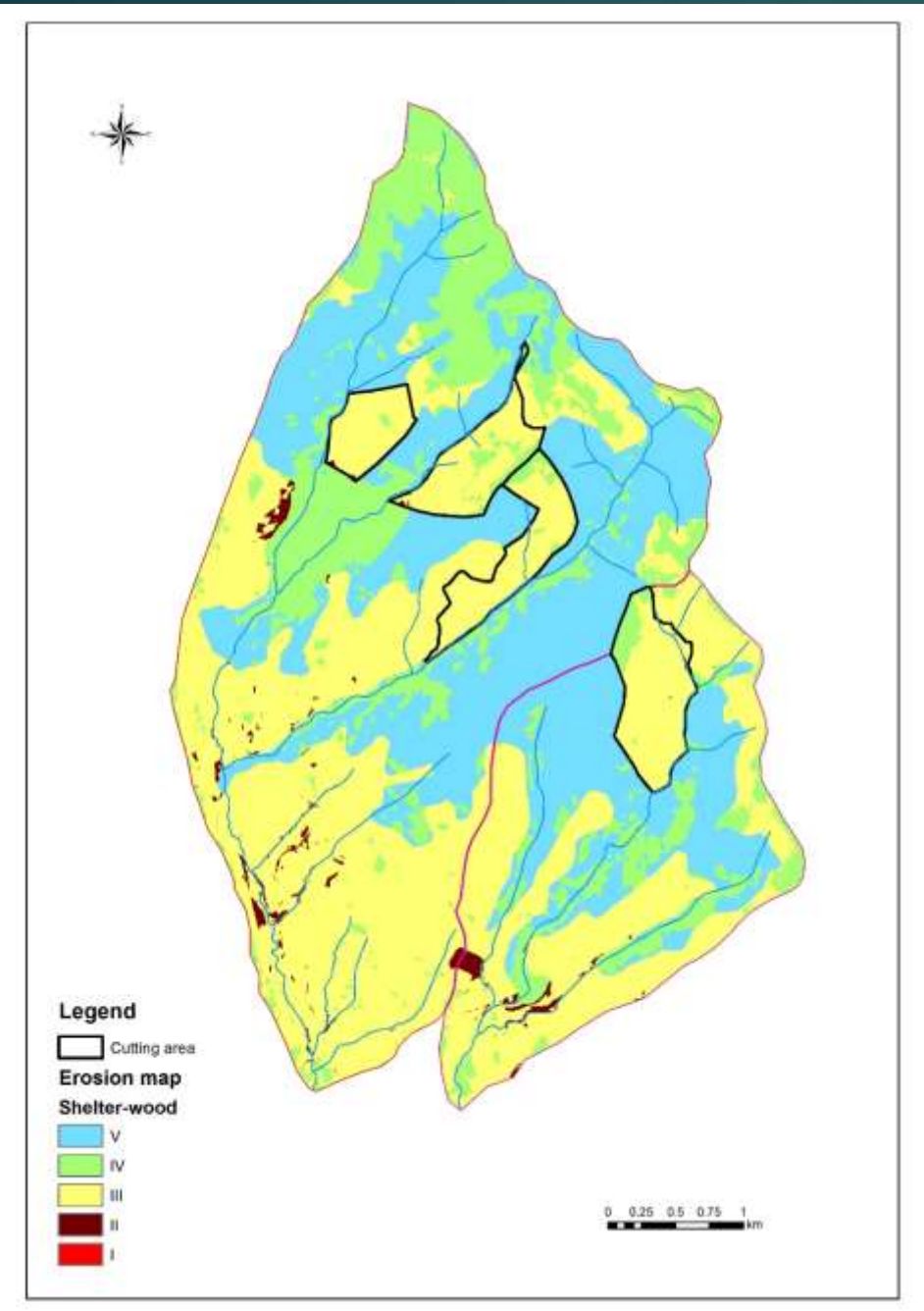
No activities



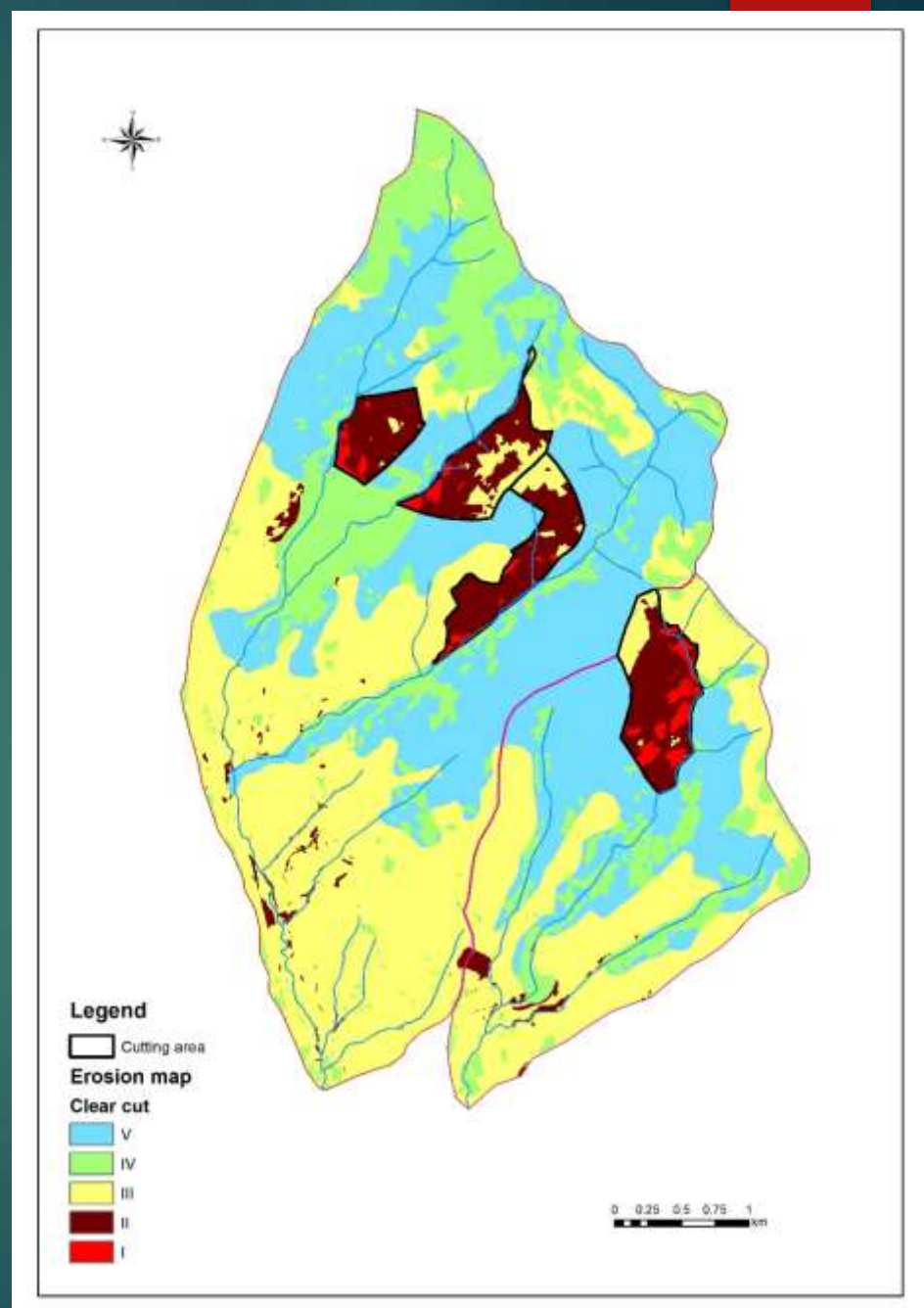
Selective cut



# Shelterwood cut



# Clear cut





**Thank you for your attention**