SOIL ORGANIC CARBON VARIATION: A DUAL PERSPECTIVE ON LAND USE CHANGES AND SPATIAL DISTRIBUTION IN NEAMTU CATCHMENT

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Introduction

Soil is the largest land sink of carbon.

- Supporting Biodiversity
- Nutrient Cycling
- Water Retention and Filtration
- Soil Fertility and Productivity
- Climate Regulation
- Carbon Sequestration

Soil and United Nations Sustainable Development Goals
Source: https://www.eea.europa.eu/

Goal 2: Zero Hunger
Goal 3: Good Health and Well-being
Goal 6: Clean Water and Sanitation
Goal 11: Sustainable Cities and Communities
Goal 12: Responsible consumption and Production
Goal 13: Climate action
Goal 15: Life on Land

Methodology

Bibliographic documentation

Data

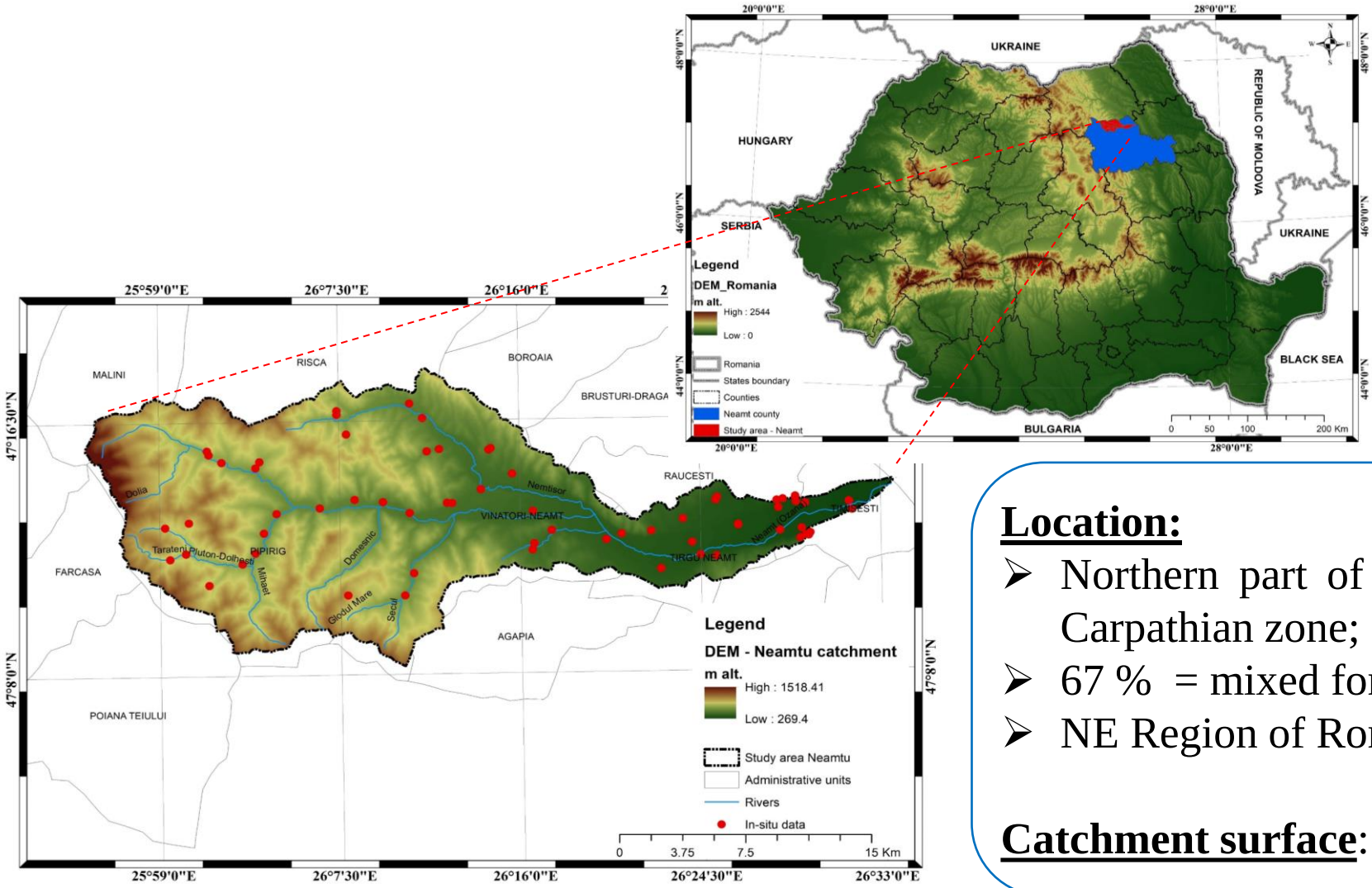
- Corine Land Cover 1990, 2018 → *Land Monitoring Services*
- Romanian soil distribution → Classified on: **World reference base for soil resources**
- Soil Organic Carbon → IN- SITU DATA

Soil samples = 65 samples -> 0 – 30 cm

- Analysed using combustion at 1000°C
- *Analytik Jena multi N/C 2100 with HT 1300 solid module*

Soil sampling → Sample analysis – pH, conductivity → Sample preparation for analysis

Study area



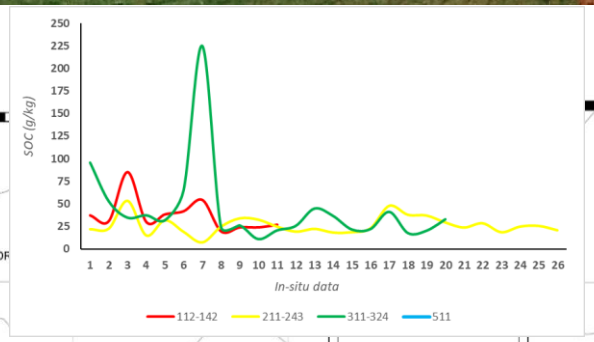
Study area – Neamtu catchment

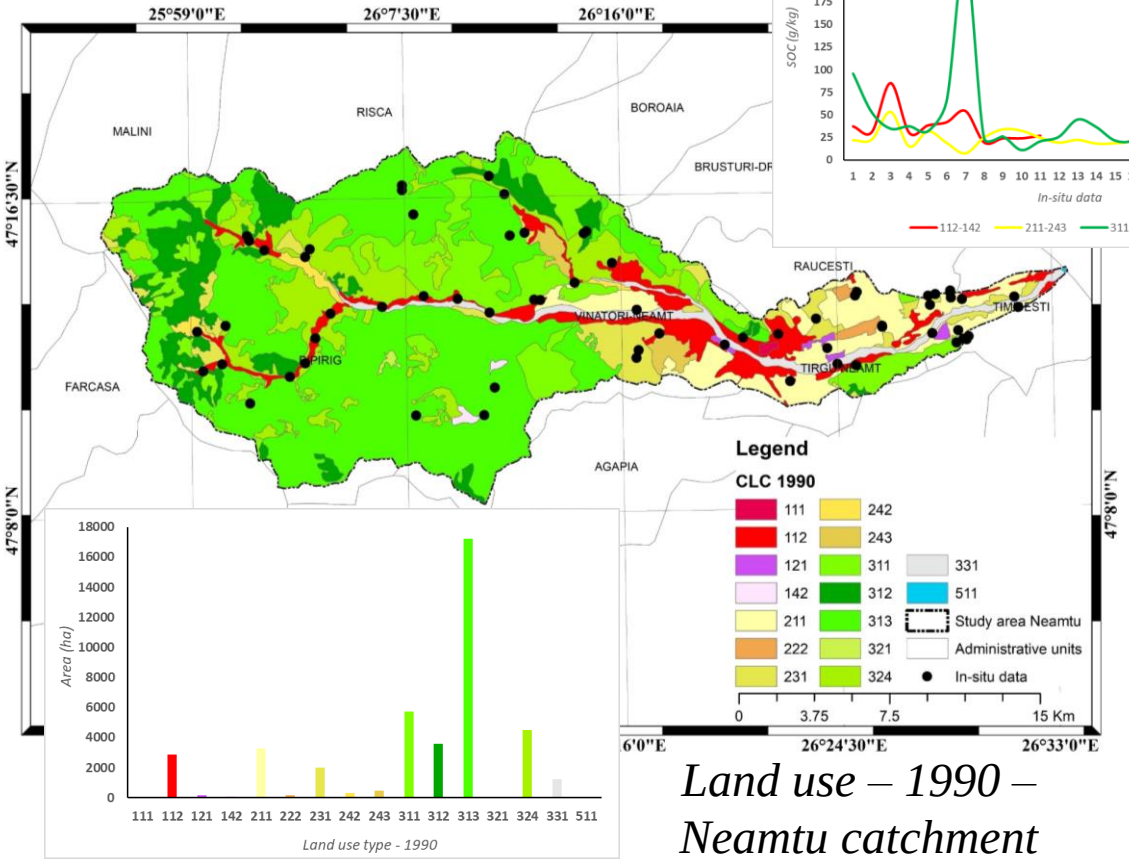
Location:

- Northern part of Neamtu county, Carpathian and sub-Carpathian zone;
- 67 % = mixed forest
- NE Region of Romania;

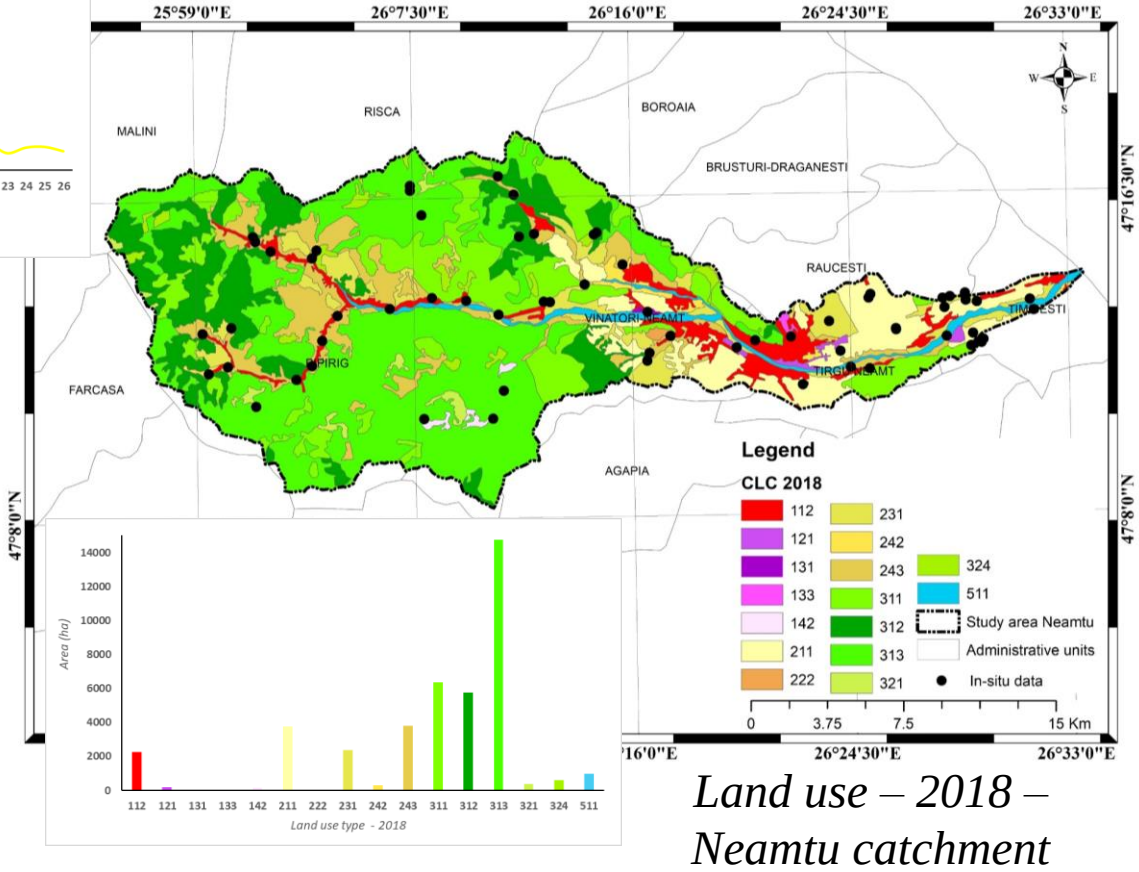
Catchment surface: 41808,62 ha

Results





Land use – 1990 – Neamtu catchment



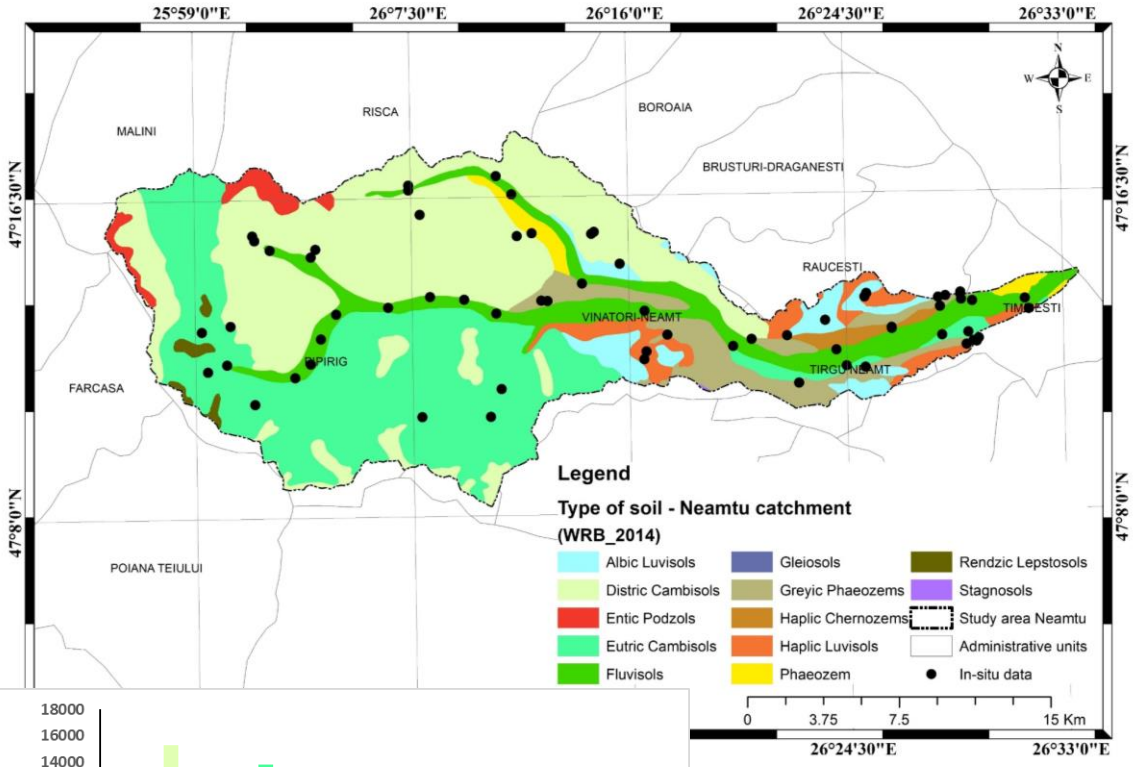
Land use – 2018 – Neamtu catchment

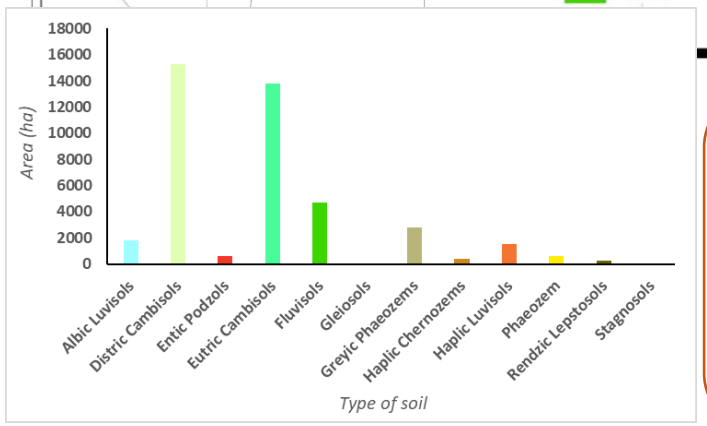
FOREST AND SEMI NATURAL AREAS *(311, 312, 313, 321, 324, 331):*
1990 = 77,43 %
2018 = 66,68 % ↓

AGRICULTURAL AREAS *(211, 222, 231, 242, 243):*
1990 = 15,06 %
2018 = 24,66 % ↑

ARTIFICIAL SURFACES *(111, 112, 121, 131, 142):*
1990 = 7,5 %
2018 = 6,32 % ↓

WATER BODIES *(511):*
1990 = 0.009 %
2018 = 2,34 % ↑

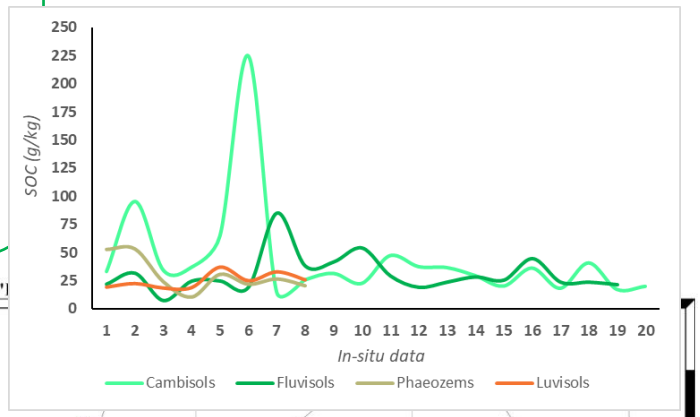




Type of soil distribution

The most predominant type of soil:

- **Cambisols** → 69,49 %
- **Fluvisols** → 11,19 %
- **Phaeozems** → 8,20 %
- **Luvisols** → 7,97 %



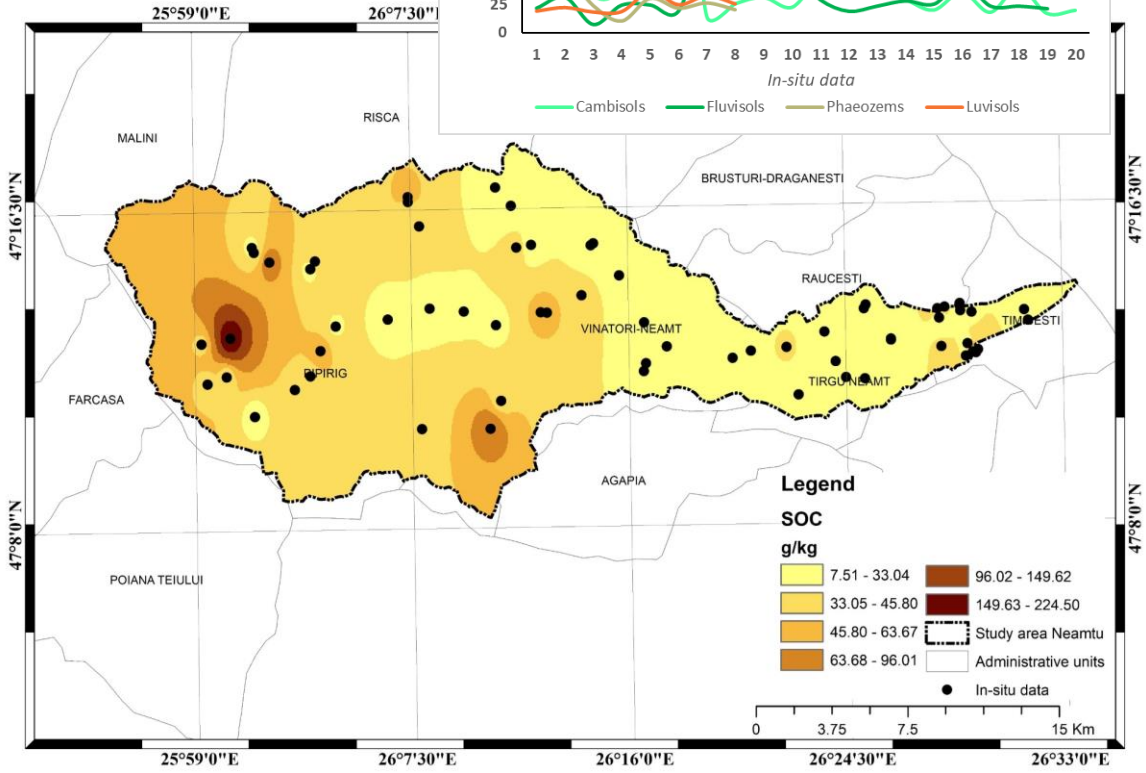
SOC = 7,51 –> 224,50 g/kg *(0-30cm)*

Highest value:

Cambisols = *224,50 g/kg - Coniferous forest*

Lowest value:

Fluvisols = *7,5 g/kg - Pastures*



Soil organic carbon distribution

Conclusions

- Soil organic carbon (SOC) is a critical component of the global carbon cycle and plays a crucial role in maintaining soil health and fertility.
- Understanding the variation in SOC levels is essential for effective land management and climate change mitigation.
- Land use changes have a significant impact on SOC levels. For example, the conversion of natural ecosystems to agricultural land often leads to a decline in SOC due to the disturbance of soil structure and the loss of organic matter.
- SOC levels are often higher in forested areas compared to grasslands or croplands due to the greater input of organic matter from plant litter and root exudates.

ACKNOWLEDGEMENTS

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