

The [ECOSPHERE research group](#) aims to study aquatic and valley ecosystems that are continuously challenged by natural and anthropogenic stressors. The research focuses on acquiring fundamental and applied knowledge at different levels of structural and functional organisation in order to underpin environmental management decisions.

## MASTER THESIS SUBJECT 2023

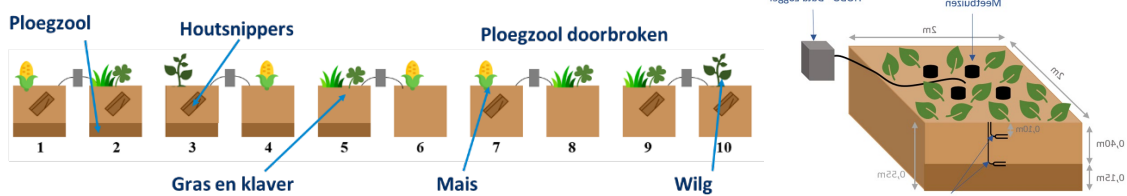
### Soil Hydrology of Experimental Soil Setups

**Research group:** ECOSPHERE

**Hosting laboratory:** CDE – Building C

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#### Experimental setup + different treatments

- This topic mostly contains  literature study,  lab work,  field work,  experimental work,  GIS,  numerical modelling,  other: .....
- Possession of driver's license B is  needed,  recommended,  not needed
- Possession of certificates needed:  FELASA C,  other: .....



### Background of the Study

Anthropogenic activities have affected soil hydrology. Extensive tillage and animal trampling can induce soil compaction, which hinders soil water percolation and hence groundwater recharge. Applying wood chips in soil can also help increase the soil’s organic matter content, thereby increasing the hydraulic conductivity of soil that promotes faster percolation. Furthermore, natural factors such as root growth and burrowing of earthworms though should not still be ignored as they can potentially promote presence of preferential flow pathways for easier soil percolation.

This research involves experimental setups whose variables include presence of subsurface soil compaction, presence of wood chips, and vegetation types (maize, grasses and clovers, willows). Soil moisture content has been monitored since the summer of 2022.

### Research Question

How does the soil hydraulic properties induced by various practices and natural factors affect the soil hydrology?

### Research Objectives

1. To quantify or determine the differences in the soil hydraulic properties across the setups
2. To infer the role of these measured or determined soil hydraulic properties in infiltration and percolation that leads to potential groundwater recharge

### Proposed Methods

1. Time-series analyses
 

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  - a. Cross-correlation among soil moisture content measurements and rainfall
  - b. Recession analyses of soil moisture content

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2. Measurements of soil hydraulic properties (summer 2024)
 

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  - a. Field
 

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    - i. Penetrometer
    - ii. Beerkan Tests
    - iii. Soil coring and dye tracing

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  - b. Laboratory
 

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    - i. Grain Size Analyses
    - ii. Saturated Hydraulic Conductivity
    - iii. Soil Organic Matter Content
    - iv. Bulk Density and Porosity

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