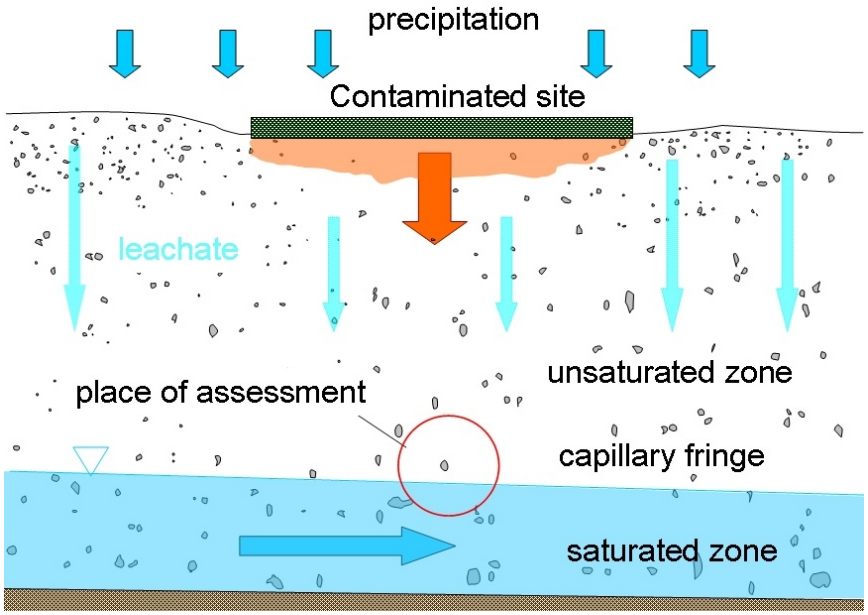
1. Sensitivity analysis of parameters of water and contaminant transport in the soil

Literature research and literature compilation



Which parameters influence contaminant transport in the unsaturated zone of the soil the most?

Sensitivity analysis of parameters of water and contaminant transport in the soil

TASKS:

1.General overview over literature regarding sensitivity analysis in the unsaturated zone

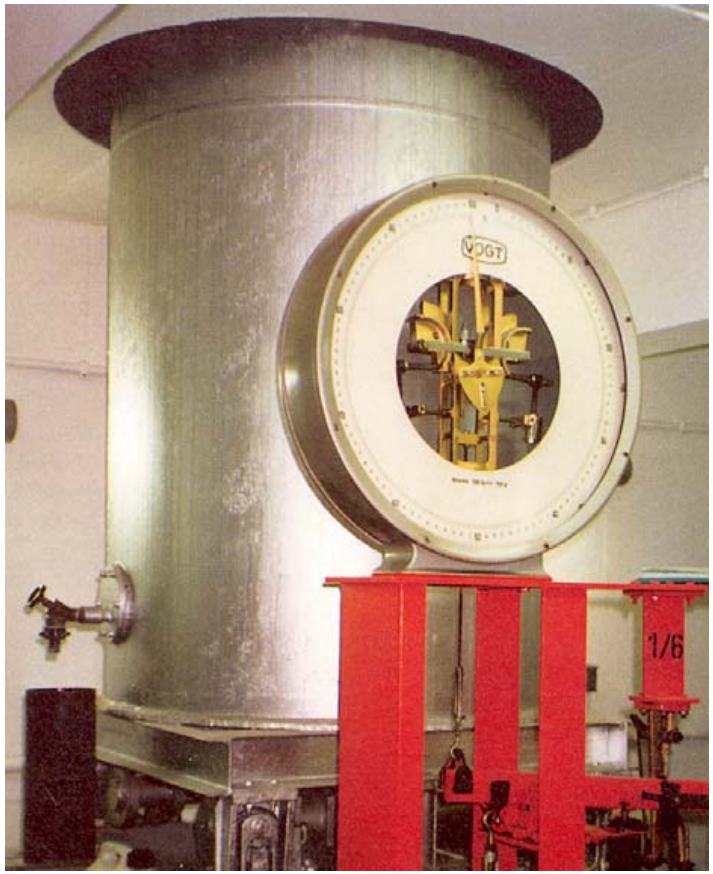
2.Which parameters influence the soil water balance the most? (porosity, residual water content, van Genuchten parameters,…)

3.Which parameters influence contaminant transport the most? (diffusion coefficient, bulk density, sorption…)

4.Create overview with most influencial parameters and reference literature

→ If it meets the interest of the student, task can be extended to performing a sensitivity analysis with a given model.

2. Comparing different pedotransfer functions for modelling the water balance of a lysimeter



Modelling with the software tool PCSiWaPro

- Pedotransfer funtions translate basic soil data into hydraulic properties of the soil

- Pedotransfer funtions are empirical funtions, therefore specific pedotransfer functions are used for specific problem definitions

- Lysimeters are used to asses the water balance of the soil, especially the groundwater recharge

Comparing different pedotransfer functions for modelling the water balance of a lysimeter

TASKS:

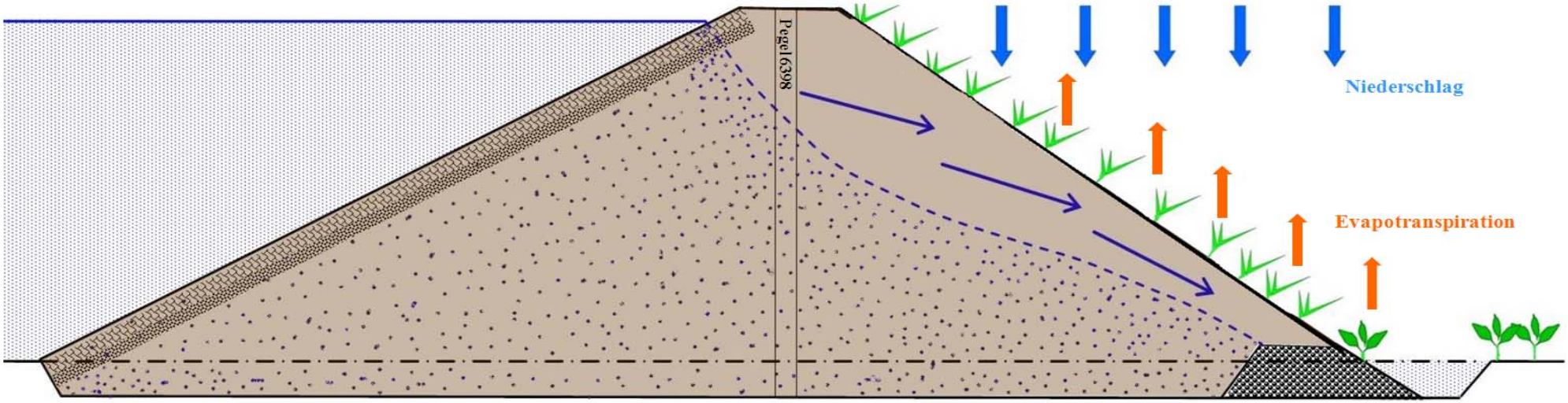
1.Create overview over given pedotransfer funtions (Vereecken , Weynants, Teepe, Wösten) with the help of literature

2.Use pedotransfer funtions to depict set of soil parameters

3.Assess water balance of the lysimeter with the help of each set of soil parameters

4.Compare results and give recommendation which pedotransfer function to use for specific problem

3. Investigation of processes influencing the surface water balance in earth dams, dikes and dump slopes



•Water balance at dam/dike/slope surface is determined by precipitation, evapotranspiration, surface runoff, water saturation, root water uptake, ...

•Individual models exist to represent each of these processes

•Water balance in slopes is a crucial information for the determination of its stability

Investigation of processes influencing the surface water balance in earth dams, dikes and dump slopes

TASKS:

1.Create overview over given models describing the interdependency between precipitation, upper soil moisture, infiltration rate and runoff

2.Create overview over given models describing water extraction from the soil as a result of plant growth

3.Identify touching points between these models

4.Estimate influence of each process on whole surface water balance in comparison to the other mentioned processes

→ This topic can be split into individual subtopics.

4. Influence of bio-/chemical processes on contaminant transport and their impact on groundwater quality

TASKS:

1.General overview over literature regarding biochemical and chemical processes in the unsaturated zone

2.Which bio-/chemical processes are the most important in unsaturated zone? In which way they influence the quality of groundwater?

3.Which bio/chemical parameters influence contaminant transport the most?

4.Perform a risk assessment analysis of contaminants and related bio-/chemical processes and their impact on the groundwater quality.

→ This task are to be performed using a given model

5. Investigation of sorption and biodegradation of wastewater contaminants using laboratory experiments

TASKS:

1.General overview over literature regarding biochemical and chemical processes

2.Determining the sorption isotherms using different wastewater' s qualities.

3.Determining the biodegration's rates of different inorganic contaminants

4.Create overview with most influential parameters

→ This task are to be performed using different laboratory methods

Contact persons for all topics:

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