Kennis voor Klimaat

Knowledge for Climate

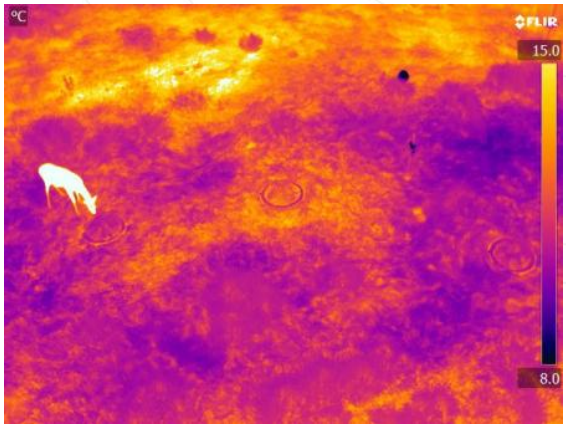
Project **Theme 3 | The future groundwater recharge: evapotranspiration response of natural vegetation to climate change**

Description of research

Climate change will affect the amount and temporal distribution of both precipitation and evapotranspiration. In the Netherlands, summer droughts are expected to occur more often and last longer, and rainfall is expected to be concentrated in more intense showers. These changes will alter the amount of water that percolates to the saturated zone, the groundwater recharge, as well as the size and dynamics of fresh groundwater bodies. Fresh groundwater is a prerequisite for many land use functions and is major source for drinking water in the Netherlands.

Current knowledge, however, is insufficient to reliably estimate the effects of climate change on future groundwater recharge and freshwater availability. Future recharge can only be assessed if we understand how vegetation responds to changing climatic conditions and how these vegetation changes will feedback on groundwater recharge due to altered actual evapotranspiration.

In this project we mainly focus on the effects of climate change on evapotranspiration characteristics of bare soil, mosses, lichens, grasses and shrubs found on elevated sandy soils. Special emphasis lies in studying the effects of the vegetation structure on the water balance.



Research question

How does climate change affect the future groundwater recharge on elevated sandy soils in The Netherlands

The most important conclusions

- Despite increased droughts, groundwater recharge might increase in a future climate due to vegetation feedbacks
- Mosses and lichens temper evaporation compared to barren soils

Possible applications from the project

- The results of this project can be used to simulate future evapotranspiration, moisture regime and groundwater recharge on elevated sandy soils. Reliable hydrological simulations are a prerequisite to assess the effect of climate change on nature, agriculture, drinking water abstraction, and other land-use functions.
- The measurement technique (a combination of mini-lysimeters with ground based remote sensing) developed in this study can be used to validate satellite based remote sensing algorithms which are used to determine the evapotranspiration of large areas like the Veluwe or coastal dunes.

Bottlenecks of the project

- Most vegetation records lack the information that is needed to simulate moisture flow and drought stress. This hampers the assessment of drought events on vegetation characteristics and evapotranspiration.
- In addition, there is a lack of long time series of vegetation records (permanent quadrates), which makes it hard to analyse the effects of climate variability on vegetation composition and vegetation structure.

Opportunities for the poject

- Process based modelling of vegetation growth and vegetation succession will partly overcome problems of data scarcity of vegetation characteristics combined with hydrological data. A prerequisite is that processes are well understood.
- Vegetation characteristics of south facing slopes might give an indication of the capacity of vegetation to adapt to a drier climate.

More information

For more information about this project please contact

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