NDMI analysis

To analyze humidity levels, we used the NDMI index data from Sentinel 2 L2A. The formula below is typically used for calculations. The study area are Pääsküla and Kudjape landfills at their borders. A total of 60 images of Pääsküla Landfill and 42 images of Kudjape Landfill were analyzed. For Kudjape Landfill, it was seasonal analysis, while for Pääsküla, it was more detailed.

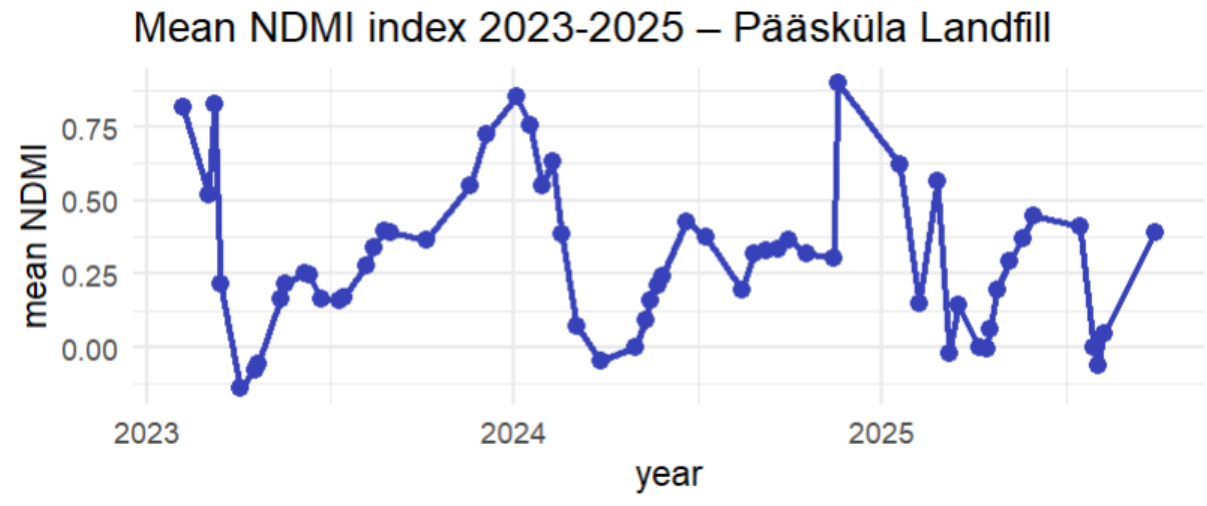
NDMI = (NIR - SWIR) / (NIR + SWIR), where:

NIR is near infrared band (B8A)

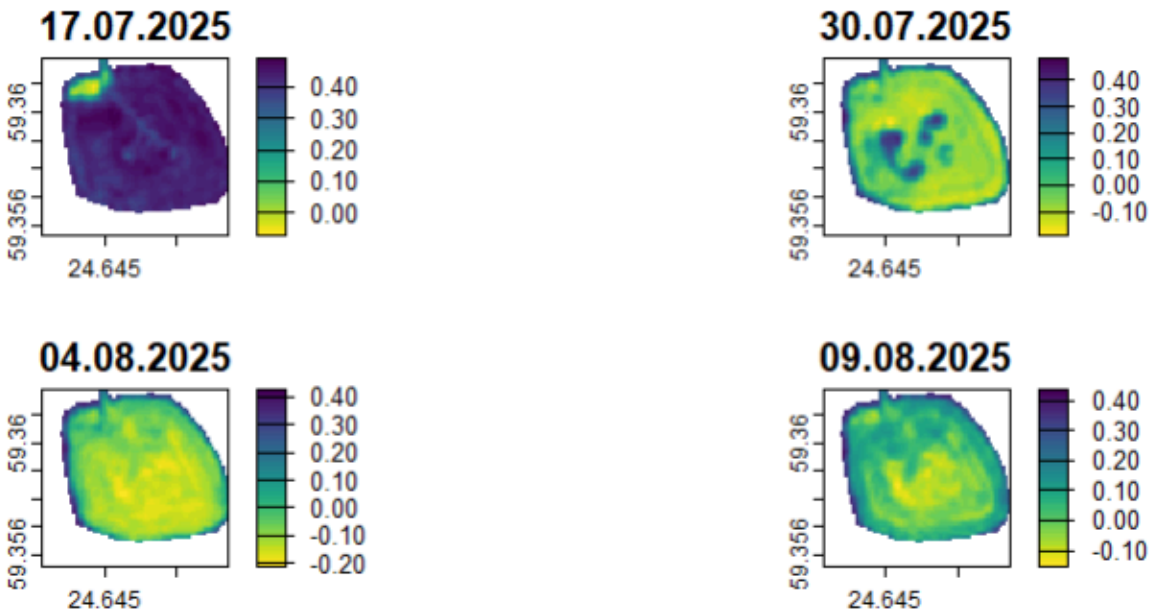
SWIR is short-wave infrared band (B11)

Pääsküla landfill

Below is a graph of average values for all cloudless dates from January 2023 to September 2025. Only those images from the time series that showed any visual change relative to the previous image were selected. Overall, the trend appears consistent: high humidity in winter and a sharp drop in spring due to the spring drought and sunny days. However, there are some unusual spikes, such as in late autumn 2024. This is likely due to snowfall and melting. A sharp drop in humidity was also observed on July 30, 2025, which will be discussed below.

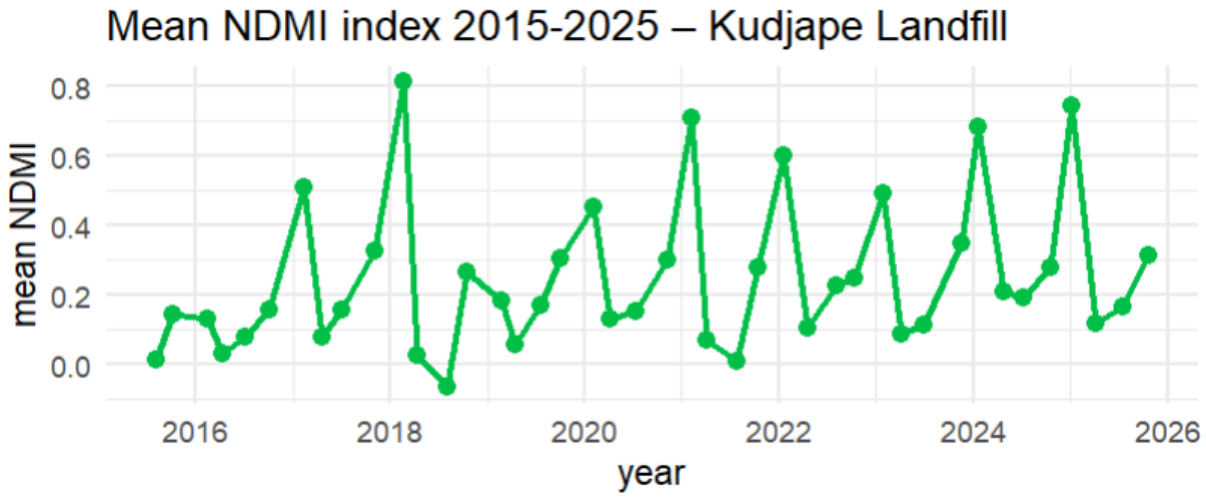


Next, attention was focused on the period from July 17 to August 9, 2025. The upper left figure shows relatively high humidity levels on the hill. Then, on July 30, a sharp drop in humidity is visible, with distinct cutoff lines that are not typical for nature. On August 4, humidity levels also drop in the biofilters. A gradual increase in humidity from the bottom to the top of the hill is visible on August 9.

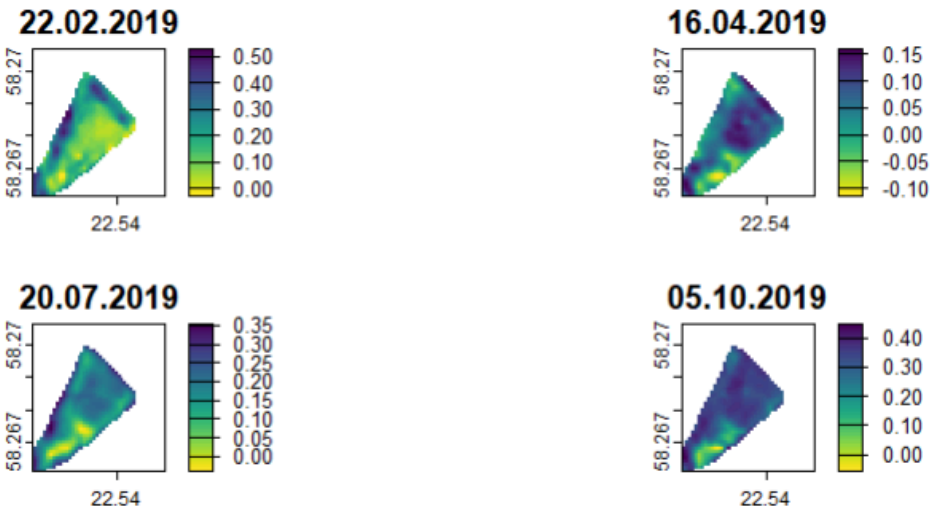


Kudjape landfill

For Kudjape Landfill, one notable image was taken for each season (winter, spring, summer, fall). The graph below also shows that humidity levels are high in fall and winter, while they are lower in spring and summer. It's also noticeable that humidity levels were unusually low in the winters of 2016, 2019 and 2020. This may be due to the snowless winter.



The image below shows that the hill was practically dry on February 22. The lack of snow on the hill is confirmed by a screenshot from the time series.



Kudjape landfill at 22.02.2019