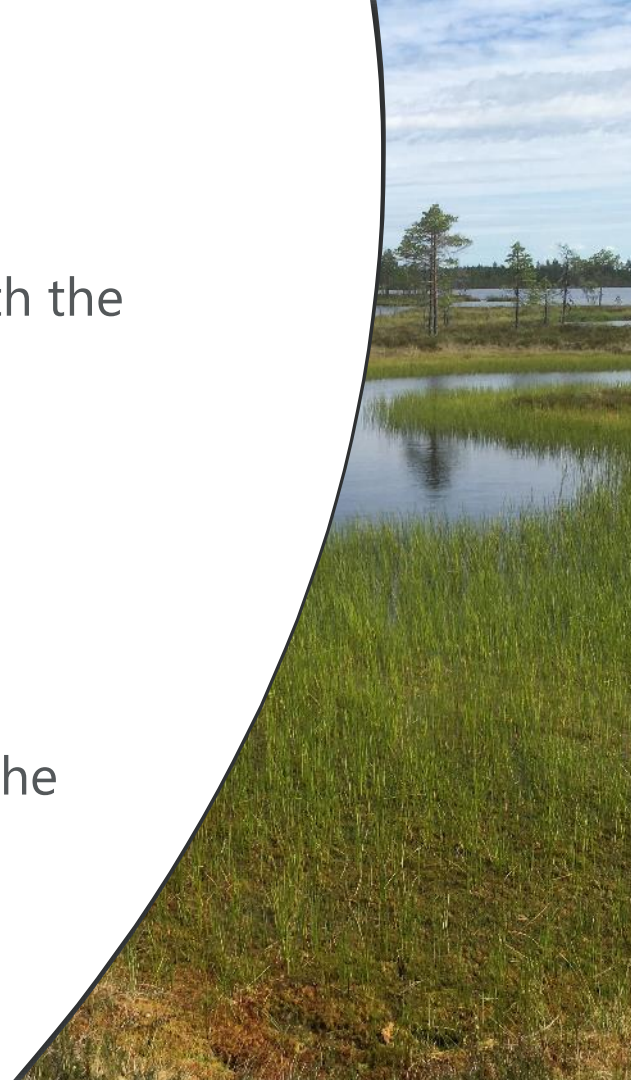
Forest ecosystem accounting

Annika Kangas

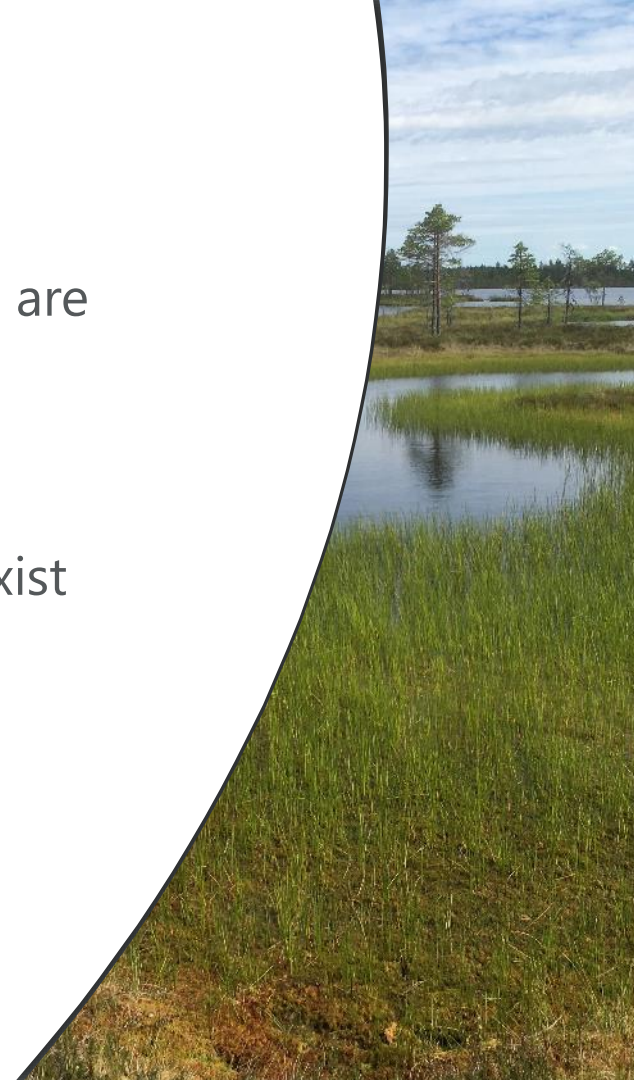
Ecosystem accounting

- Ecosystem accounting requires indicators of both the ecosystem **conditions** and **services**
    - Conditions are related to the stocks
        - Growing stock of timber
    - Services are related to the flows
        - Harvest removal
- While actual flows are difficult to observe
- Indicators on the conditions serve in assessing the production possibility of the services



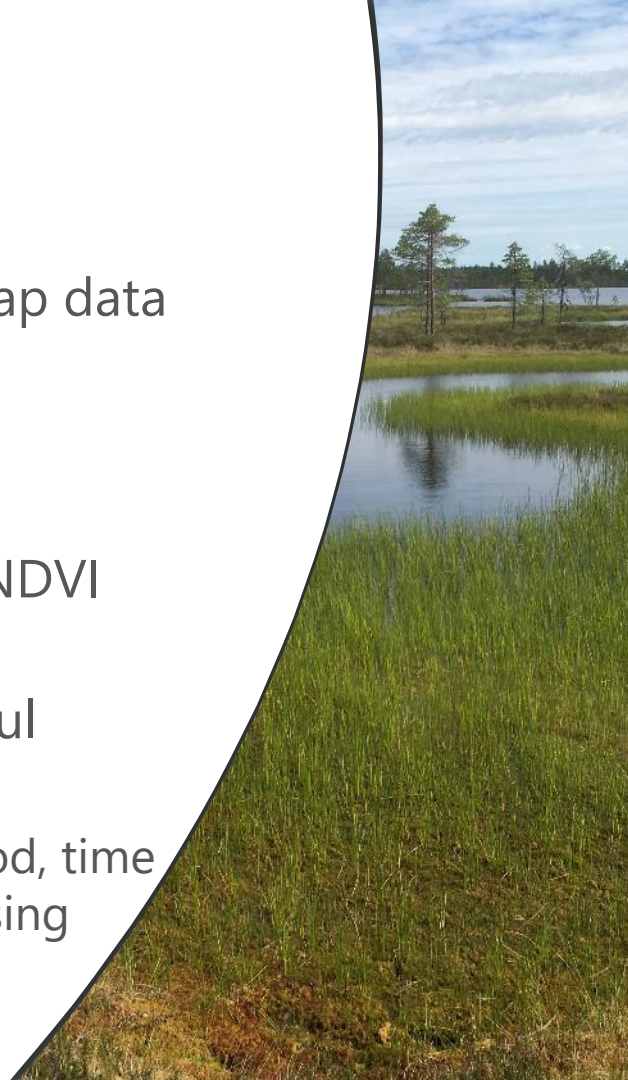
Relevant and reliable indicators for ecosystem conditions needed

- For some ecosystem services suitable indicators are scarce
    - Pollination
    - pest control
- For some ecosystem services many indicators exist
- The most useful indicators are such for which information is available
    - simple forest characteristics like forest age
    - age can serve as an indicator for carbon sequestration, recreation, flood control



Possibilities of remote sensing

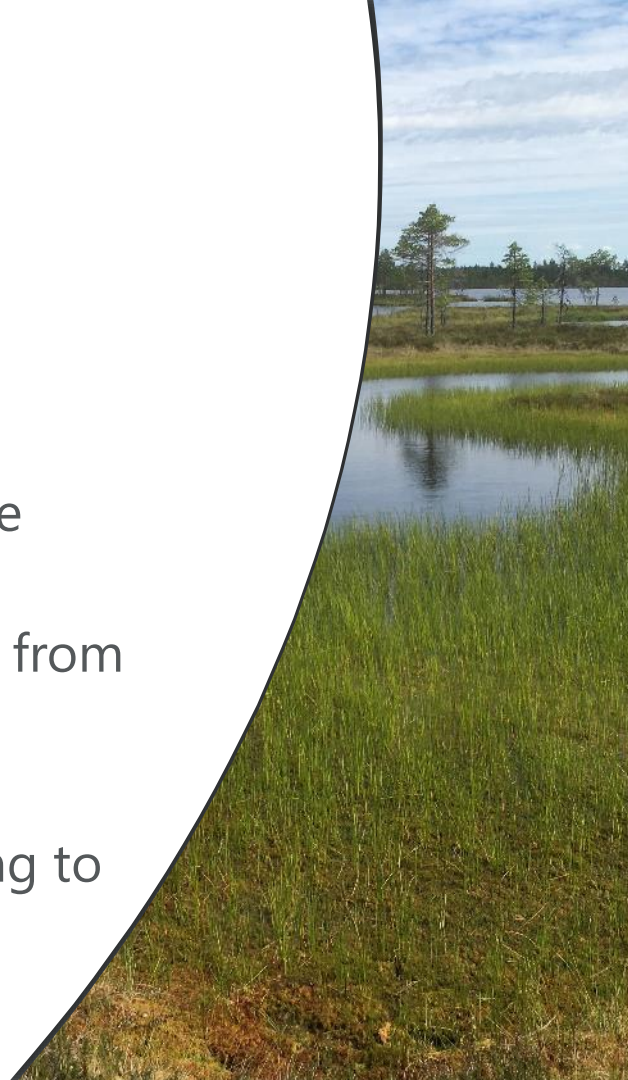
- Remote sensing is the best option to provide map data on the ecosystem conditions
- Remote sensing enables indicators describing landscape structure
- Purely remote-sensing based vegetation index NDVI may be useful as an indicator
- Yet, remote sensing restricts the number of useful indicators
    - Tree species composition, amount of deadwood, time from fire difficult to observe from remote sensing



What did we do?

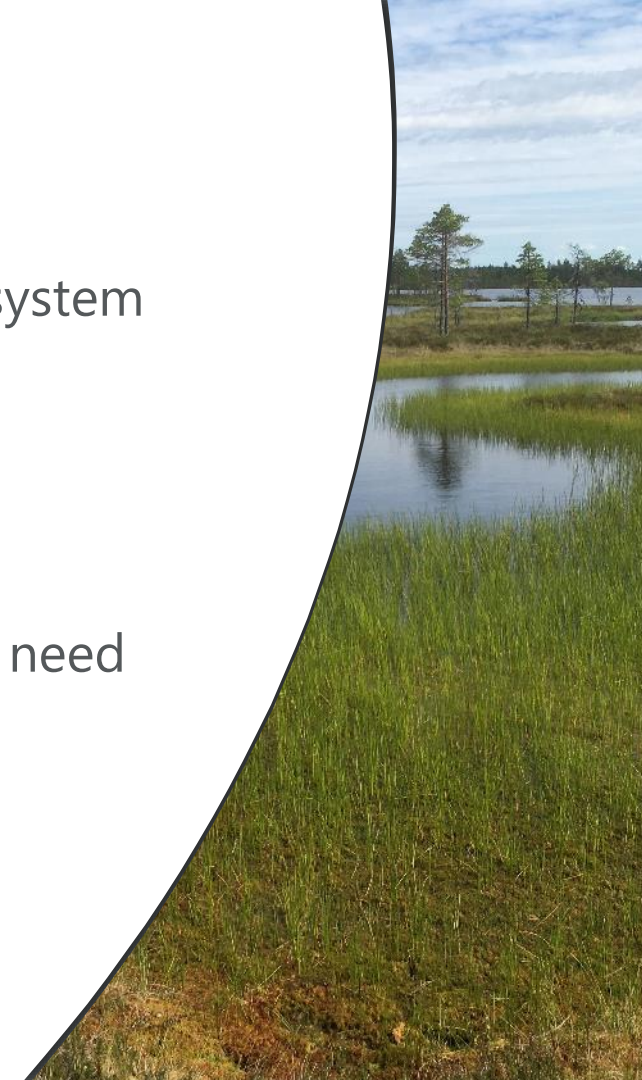
- We scanned literature for indicators that are
    - Relevant for ecosystem condition
    - Observable with remote sensing

  and Czuz et al. 2018 work for CICES proved to be especially helpful
- We then selected the most promising indicators from presented ones
    - A versatile set was strived for
- We applied machine learning and remote sensing to provide a mapping of the indicators



How to use the resulting map?

- Remote sensing enables mapping relevant ecosystem condition indicators for
    - comparison and ranking of different areas,
    - observing temporal trends within areas
- Straighforward for a single indicator
- For making several indicators comparable, they need to be transformed to a common scale
    - relative performance of indicators



Thank you!

Luke
NATURAL RESOURCES
INSTITUTE FINLAND