Testing CLMS products for monitoring agricultural landscapes and Ecological Focus Areas

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Photo: Oskar Puschmann / NIBIO

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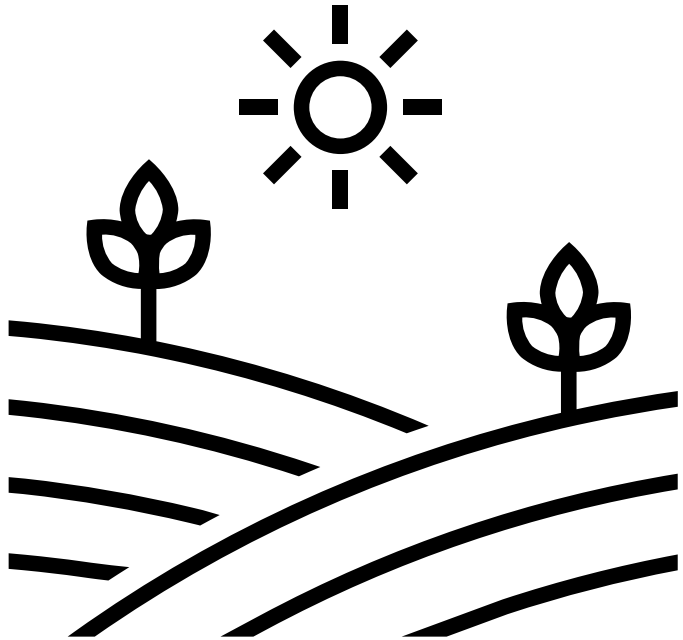
Objective

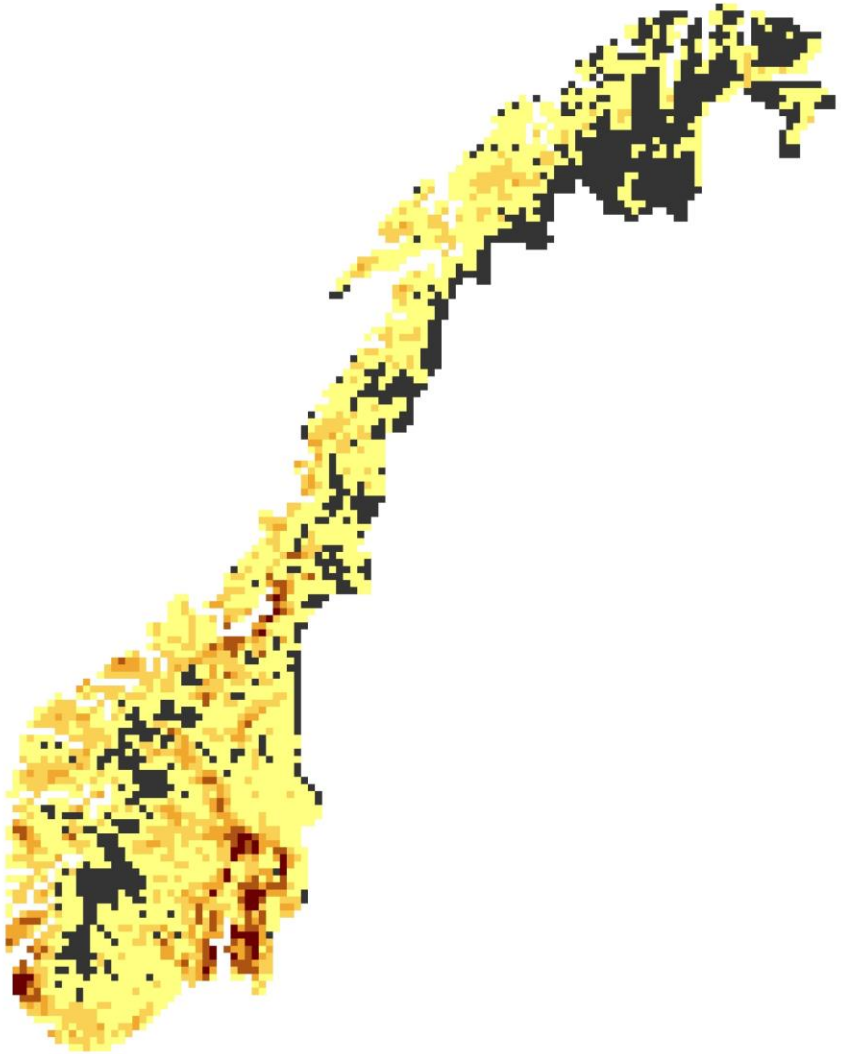
- To assess if and how CLMS products can support Common Agricultural Policy (CAP) in Poland and national agricultural policy in Norway
- Improve the user uptake of land cover and land use information derived from the integration of CLMS products and national products



- Assess CLMS products
  - Quality
  - Potential for use

Agriculture in Norway and Poland

- Agricultural land accounts for around 40 % of the EU land area
- Norway
  - 3.5 % agricultural land
  - 1 million hectare
- Poland
  - 57 % agricultural land
  - 18.7 million hectare



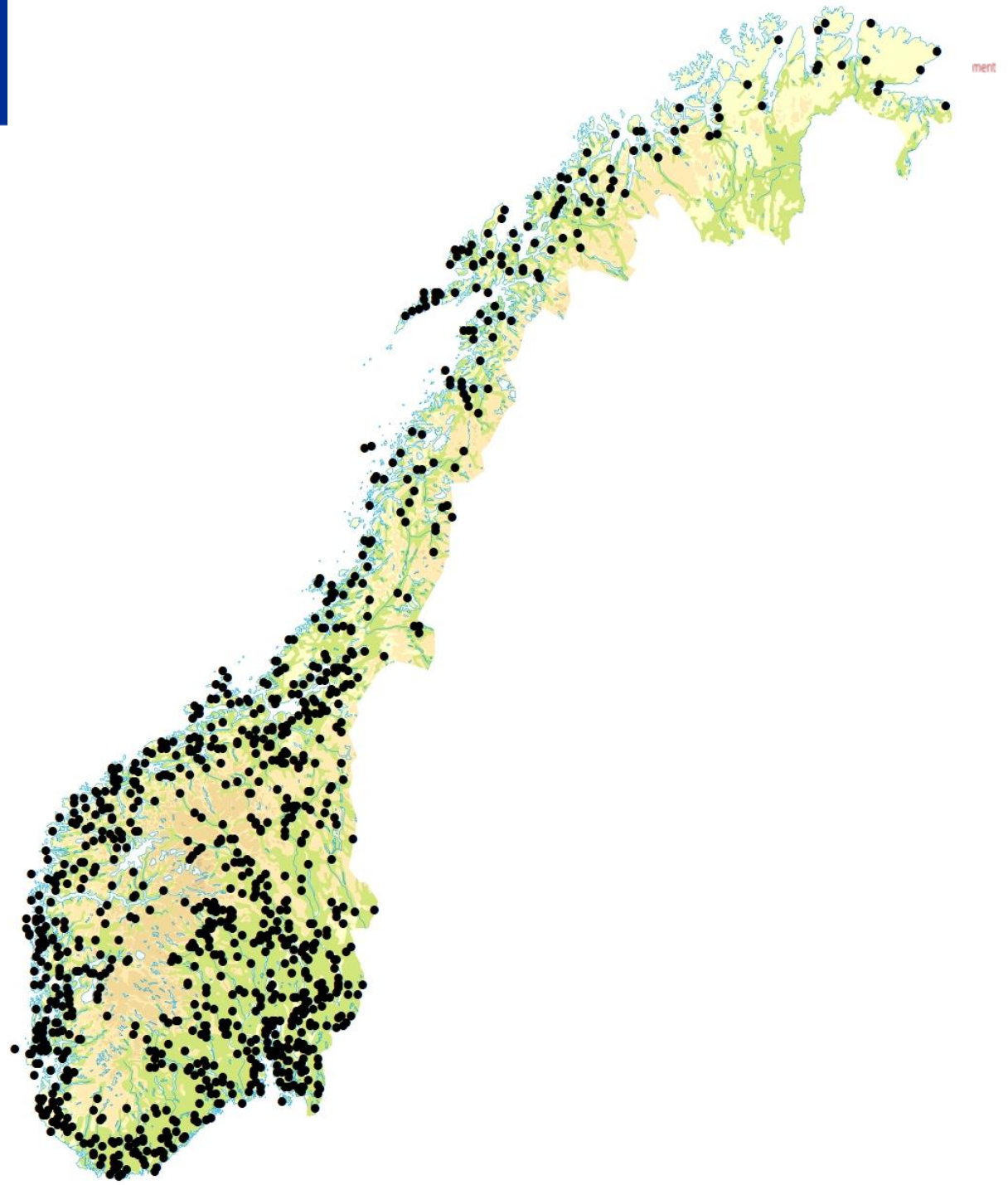
- CLMS products
  - WAW Water and Wetness High Resolution Layer
  - RZ Riparian Zones Priority Area Monitoring
  - SWF Small Woody Features High Resolution Layer
  - IMD Imperviousness High Resolution Layer
- Compare CLMS data and national data (agriculture relevant)
- National data
  - NOR: 3Q (agricultural monitoring), AR5 (land resource database), …
  - POL: BDOT (topographic objects), LPIS (Land Parcel Identification System), …

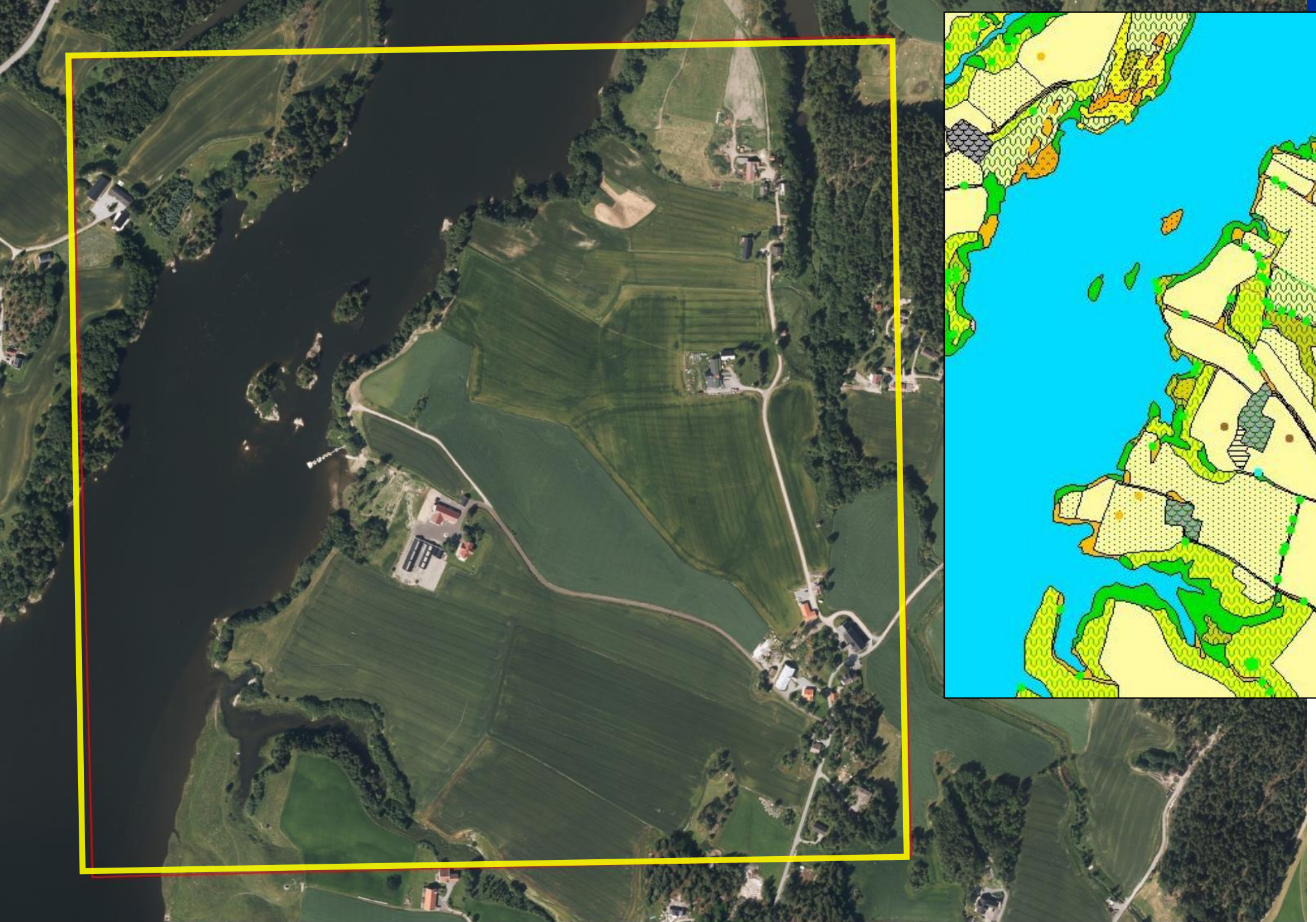
Agricultural monitoring program 3Q

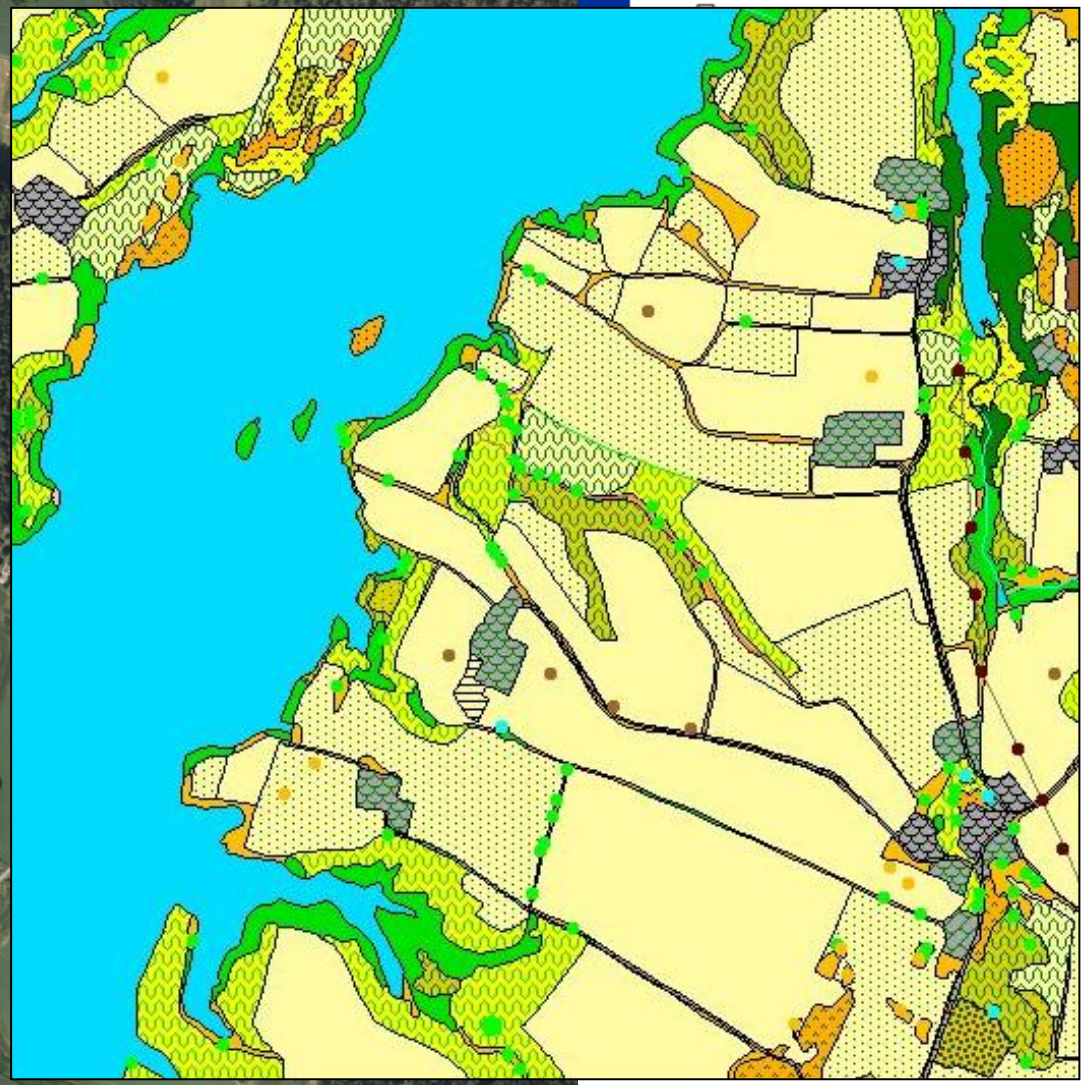
Record state and monitor changes in Norwegian agricultural landscapes

- Statistical sampling (1 x 1 km^2)
- 1 000 squares

- Mapped from aerial photos
  - Polygons
  - Linear elements
  - Points elements



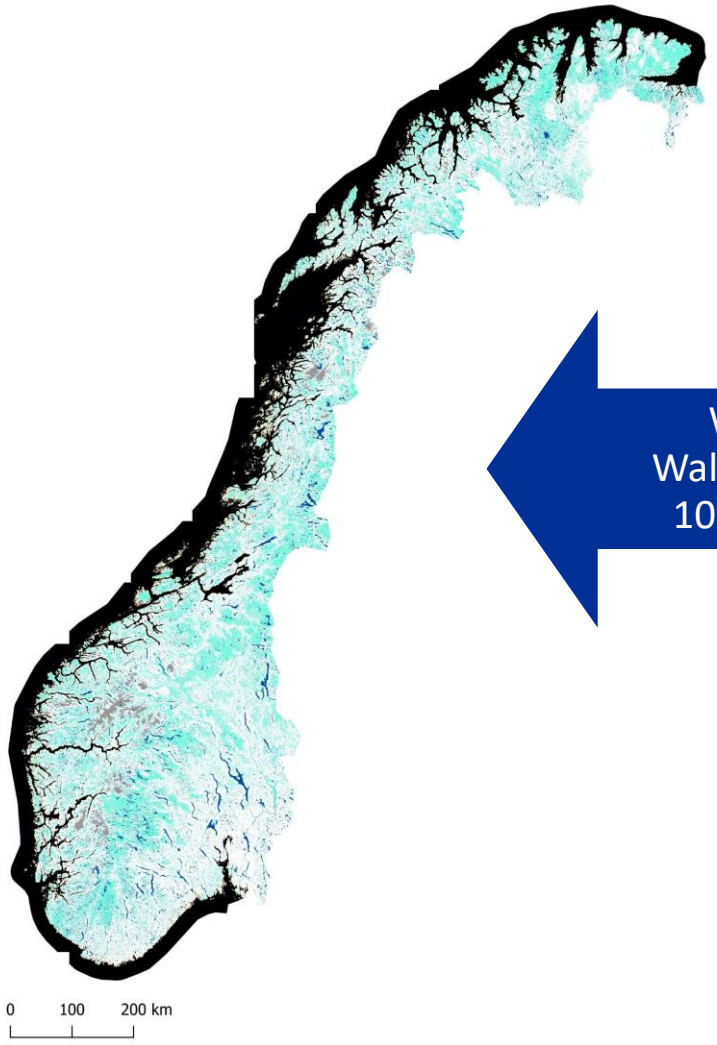




WAW

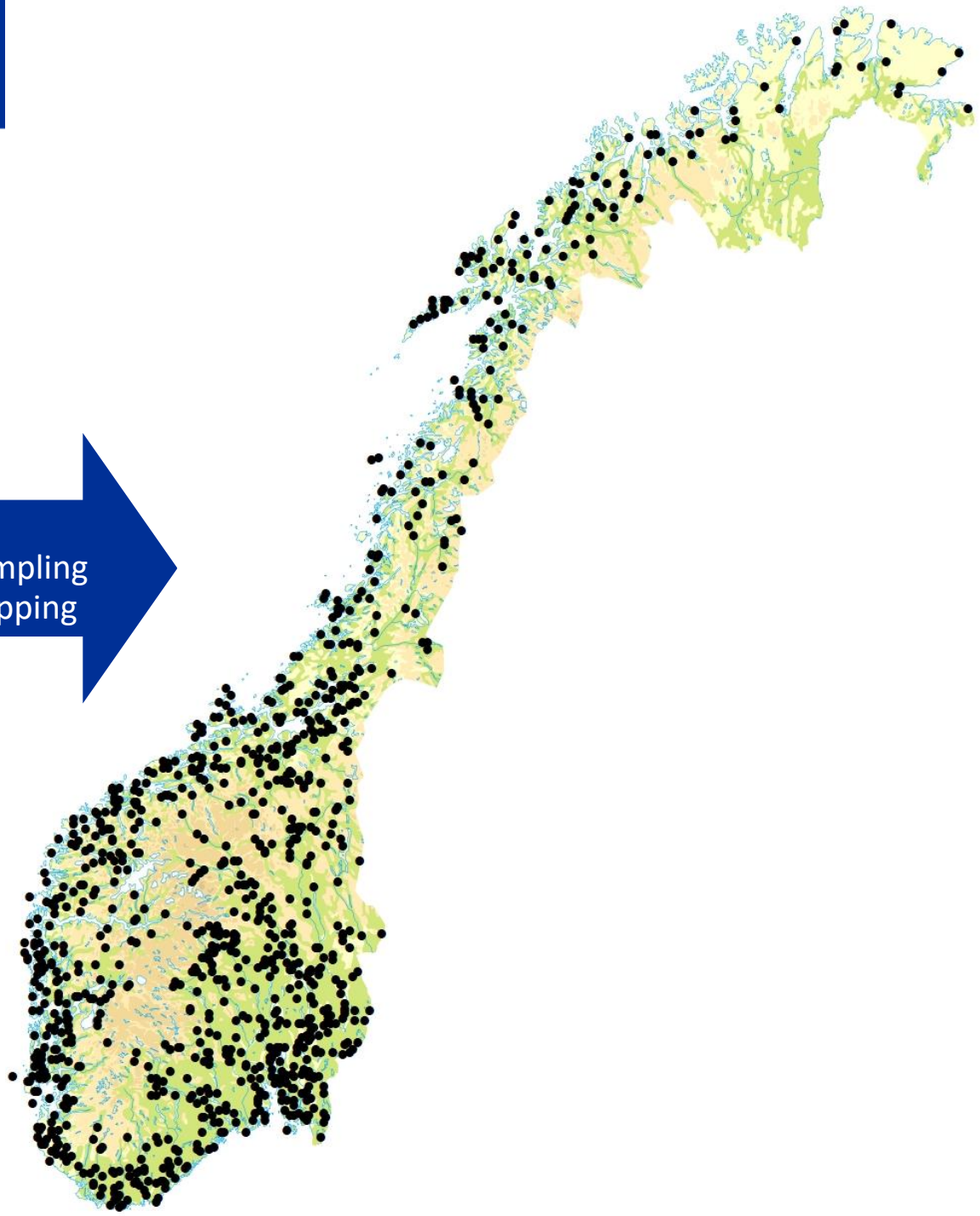
To assess if and how the CLMS product “High Resolution Layer Water and Wetness” can support the Common Agricultural Policy (CAP) in Poland and national agricultural policy in Norway

Compare WAW and 3Q



WAW
Wall-to-wall
10 x 10 m

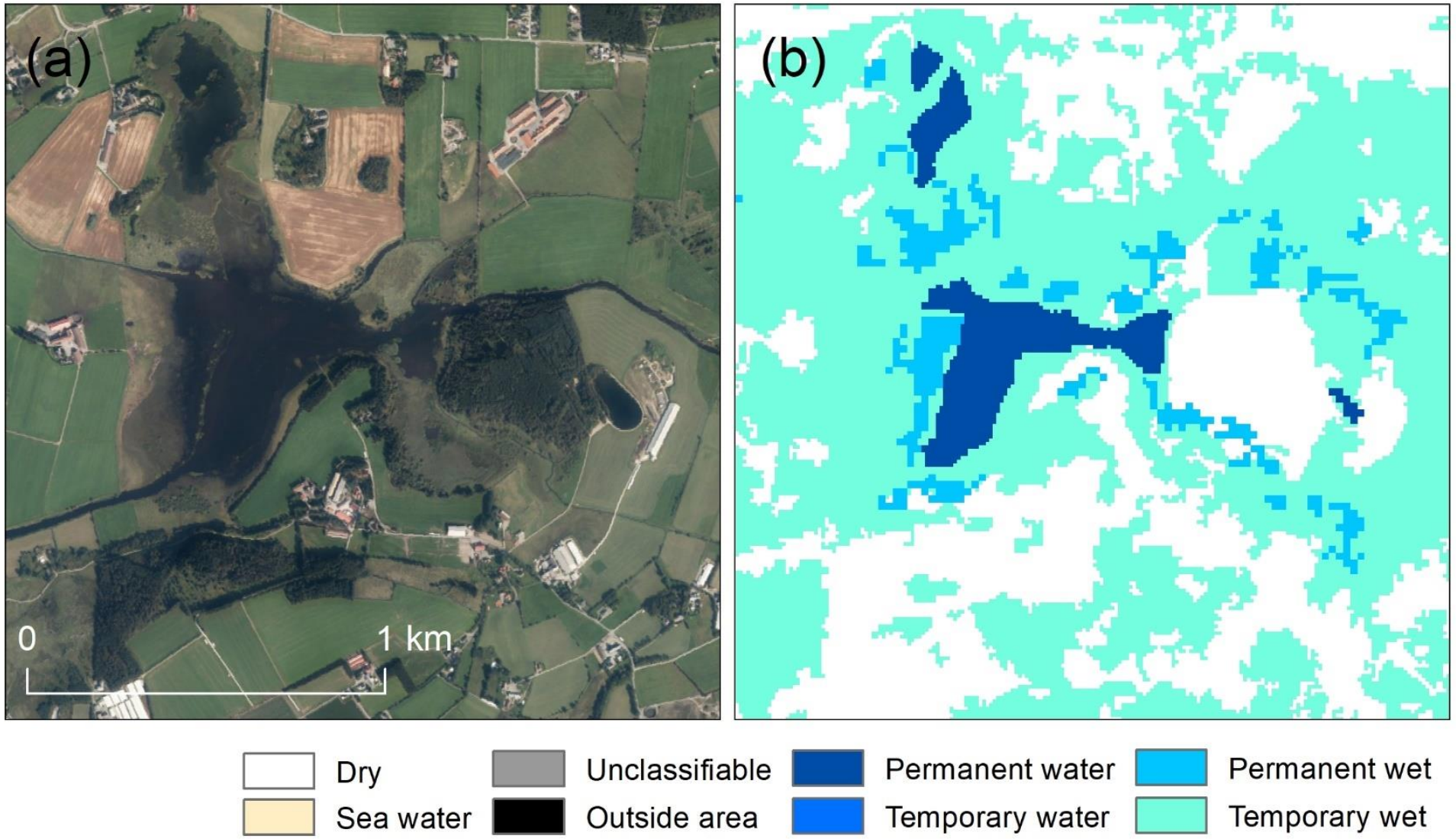
3Q
Statistical sampling
Detailed mapping



- To explore the potential of HRL-WAW for monitoring water and wetland features in agricultural landscapes and throughout the country in Norway and Poland

- Permanent water in WAW was usually correct
  … but water was missing
- Too much Permanent and Temporary wet in agricultural land
- Small and narrow objects are not detected
  E.g. ponds in Ecological Focus Areas (ponds < 1 ha)

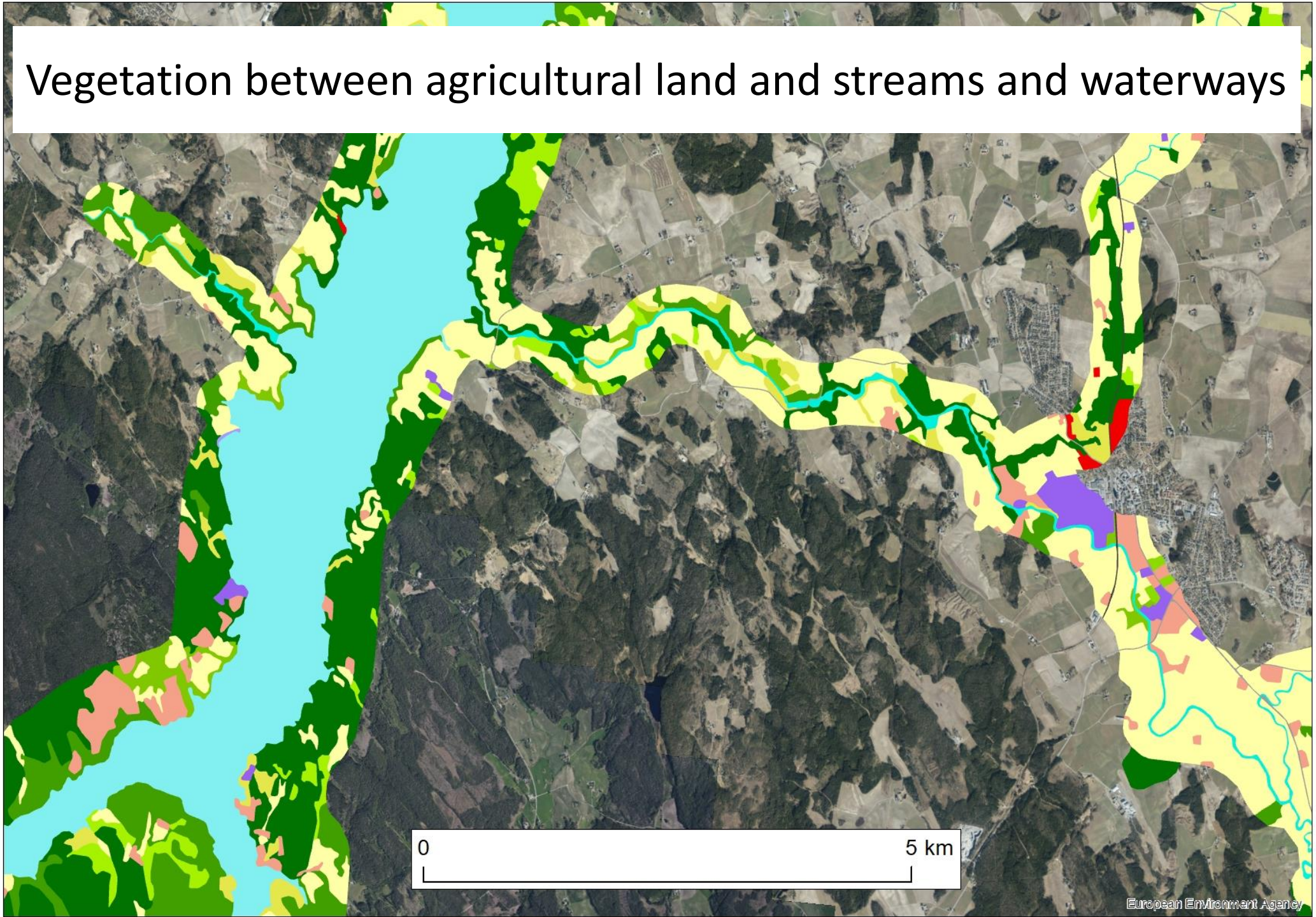
Temporary wetness

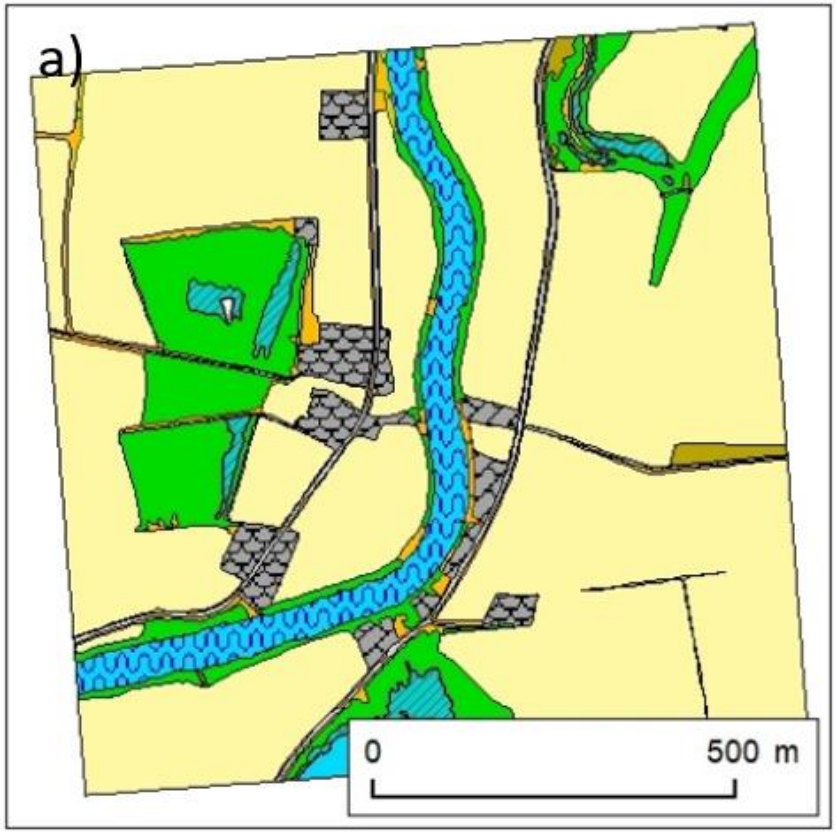


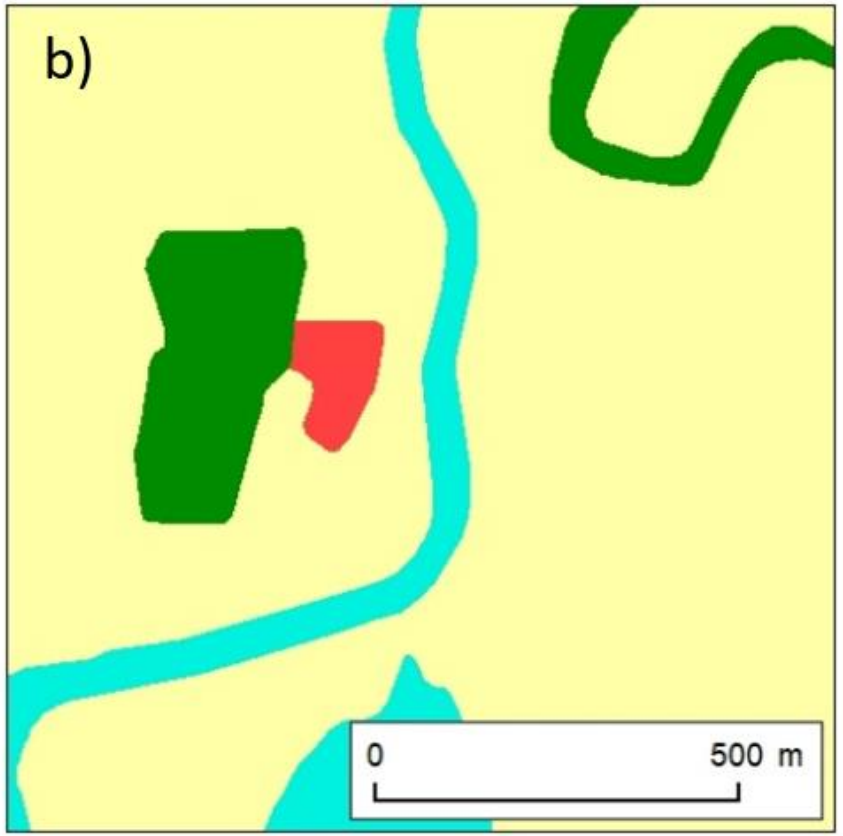
RZ

To assess if and how the CLMS product “Riparian Zones” can support the Common Agricultural Policy (CAP) in Poland and national agricultural policy in Norway

Vegetation between agricultural land and streams and waterways

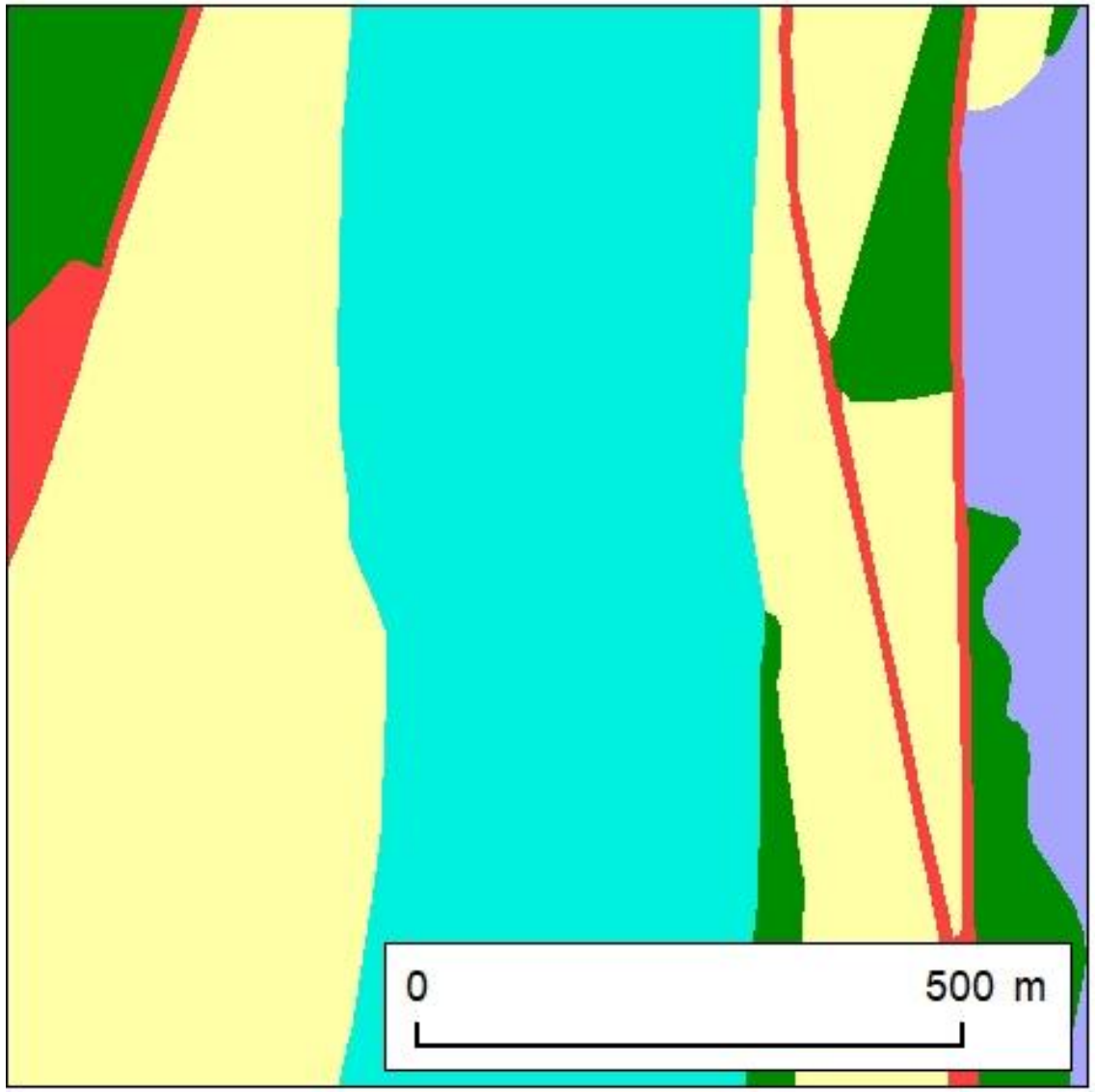






3Q

Riparian Zone



Riparian Zone

SWF

To assess if and how the CLMS product “High Resolution Layer Small Woody Features” can support the Common Agricultural Policy (CAP) in Poland and national agricultural policy in Norway

Using dataset Small Woody Features 2018 to monitor woody features in agricultural landscapes and Ecological Focus Areas

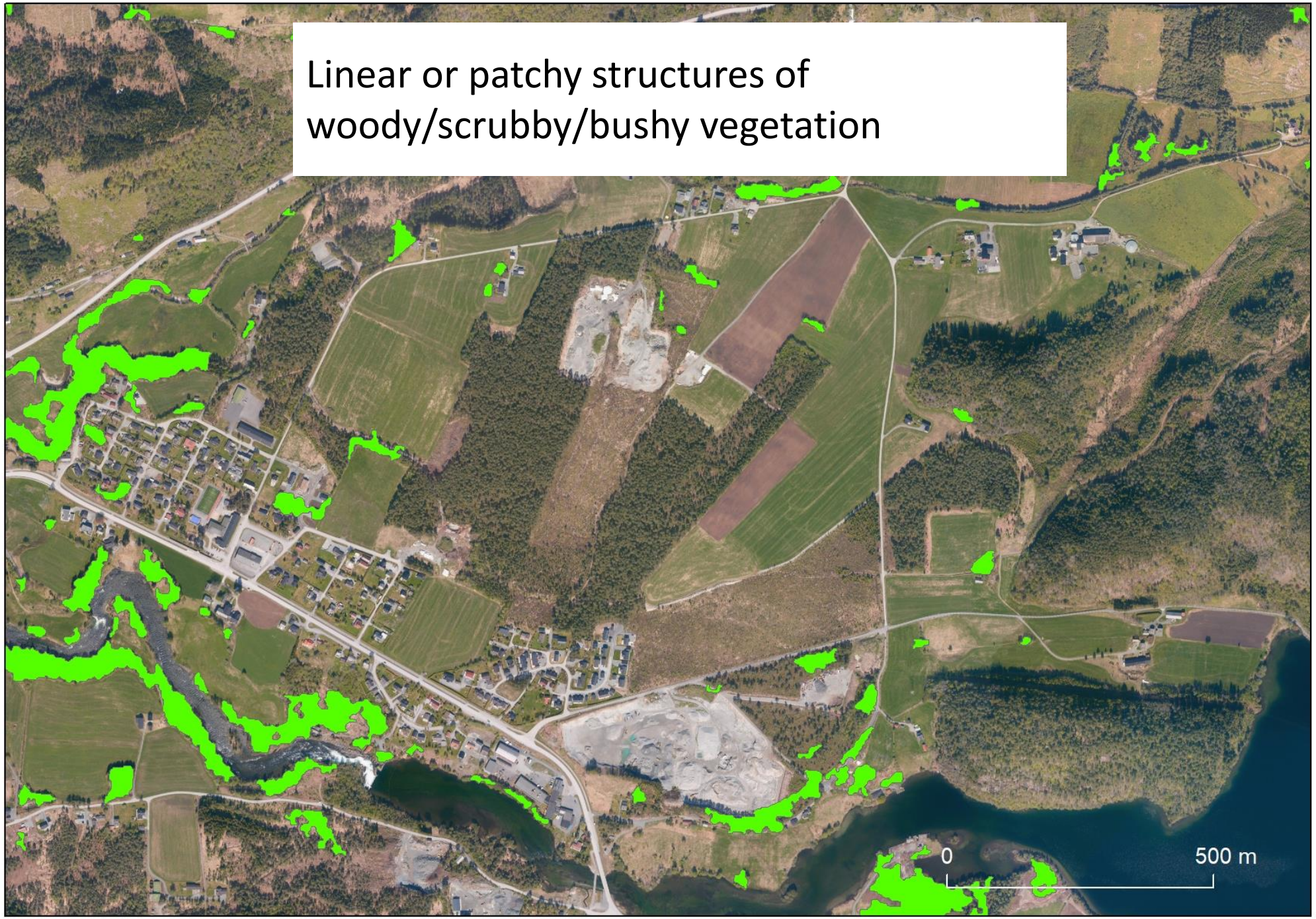
Woody features in agricultural landscapes

Small woody features (patches/lines) are important to maintain biodiversity in farmland (e.g. connectivity) and for visual characteristics in (often) homogeneous landscapes

Support a number of ecosystem services

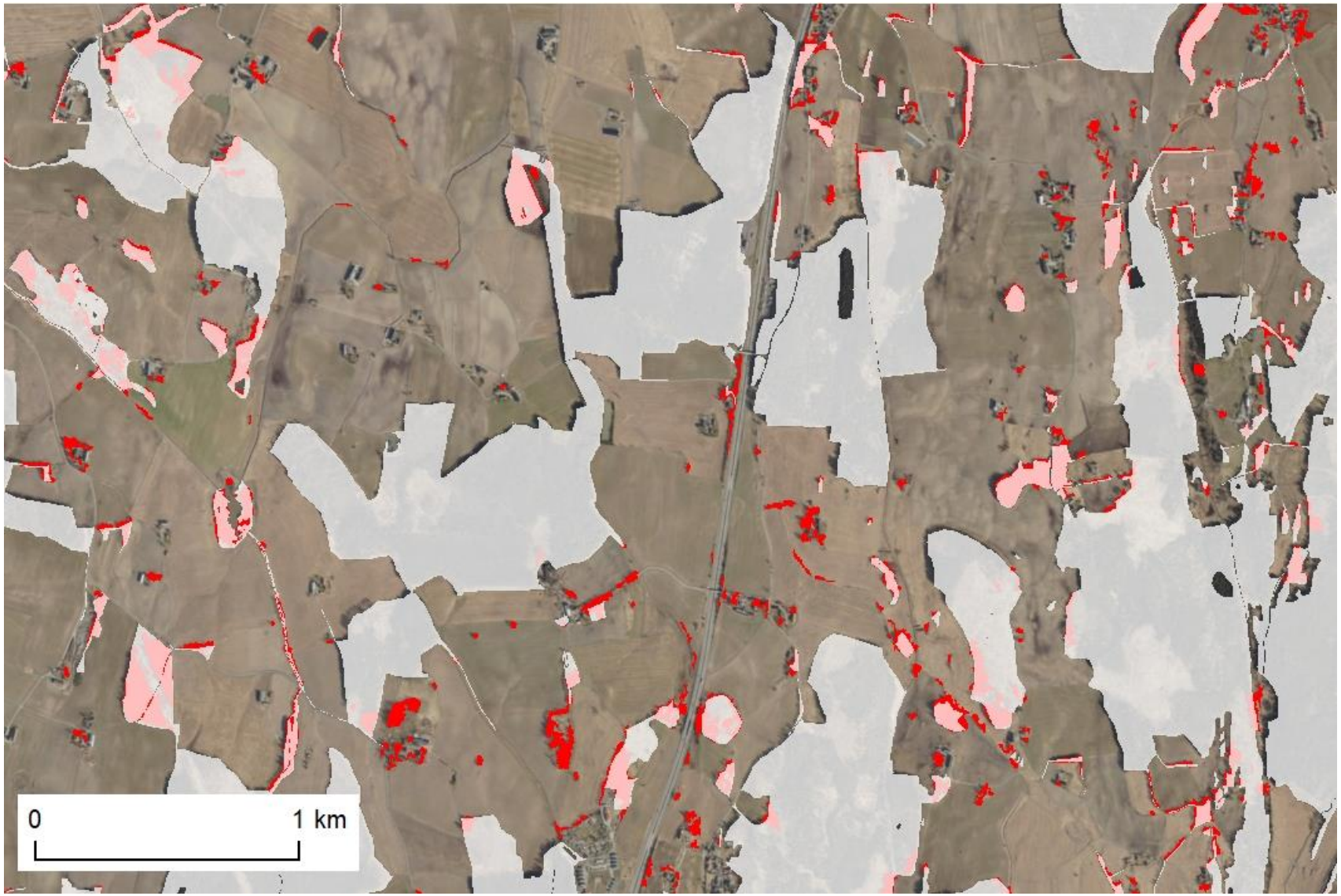
Geir Harald Strand / NIBIO

Small Woody Features



Forest Mask

SWF and AR5



AR5 Forest transparent white, SWF red

SWF and LPIS

Data from the Land Parcel Identification System (LPIS) database

- Ecological Focus Areas (EFA) elements
  - Group of trees up to 0.3 ha
- The land cover layer «management fields» (PZ)
  - Woodland and shrubs
  - Forest

SWF 2018 and FM 2018 vs EFA: group of trees up to 0.3 ha

EFA_powierzchniowe_2018_ZG

Small Woody Features 2018

Forest Mask 2018

SWF 2018 and FM 2018 vs PZ: woodland or shrubs

PZ Z – teren zadrzewiony lub zakrzewiony

Small Woody Features 2018

Forest Mask 2018

SWF 2018 and FM 2018 vs PZ: forest

PZ L – las

Small Woody Features 2018

Forest Mask 2018

Conclusions

- In general, relatively poor correspondence with national datasets, but can generally be explained by different mapping rules
- Recommend national quality assessment with aerial photographs
  - No national datasets exactly correspond for proper verification
- Because of that, might fill a gap
- Expert products exists to tune the results, but not “user friendly”

IMD

To assess if and how the CLMS product “High Resolution Layer Imperviousness” can support the Common Agricultural Policy (CAP) in Poland and national agricultural policy in Norway

Using dataset Imperviousness Classified Change 2015-2018 to monitor soil sealing in agricultural areas

Landscape change between 2000 & 2018

Land take: the transformation of agricultural, natural and semi-natural spaces into urban and other artificial uses

Soil sealing: the transformation of natural or agricultural land into impervious surfaces that prevent water infiltration into the soil

Accuracy assessment

- Imperviousness Classified Change (IMCC) 2015–2018
  - The most relevant categories of imperviousness change
- Agricultural landscape
  - Pixels with agricultural land
- Compared IMCC 2015-2018 classes with observed classes
  - as found in aerial orthophotos and/or VHR satellite imagery

Class Code	Class Name
0	unchanged areas (IMD=0%)
1	new cover
2	loss of cover
10	unchanged areas (IMD>0% at both reference dates)
11	increased IMD
12	decreased IMD

IMCC class 2 (loss of imperviousness), correct, impervious plastic-covered silage in 2015 removed in 2018.

IMCC class 11 (increased imperviousness), should have been class 10 (no change with imperviousness).

IMCC class 0 (no change no imperviousness), should have been class 10 (no change with imperviousness) due to the existence of a road in 2015 and 2018.

IMCC class 11 (increased imperviousness), correct.

Conclusions

- High overall area-weighted accuracy
  - Not useful since so much area has no change
- If we only look at change classes…
  - “High” commission error
    - Not useful
  - “Low” omission error
    - Could be useful
    - Can play a role in helping to detect soil sealing, by highlighting areas where soil sealing may have occurred, allowing the user to carry out a further control of this much smaller area, without having to assess the great expanse of unchanged area

Thank you!


John Yngvar Larsson / NIBIO