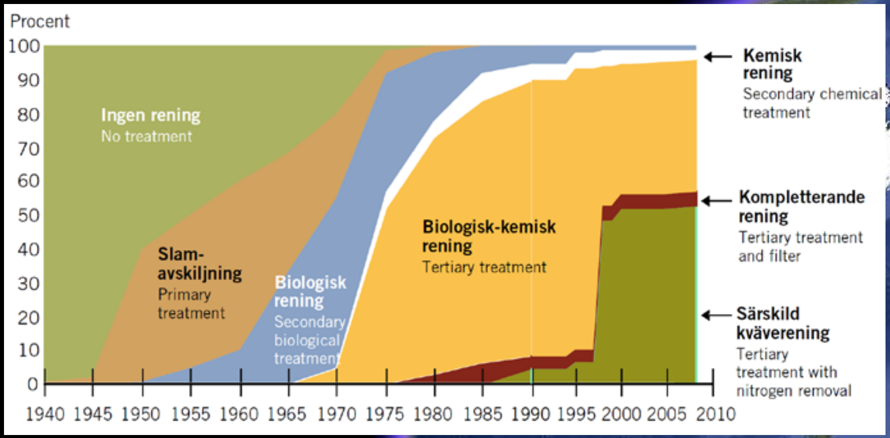
Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

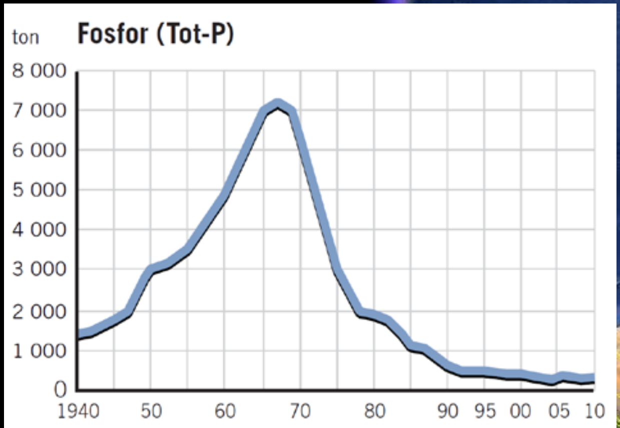
Department of Aquatic Sciences
and Assessment

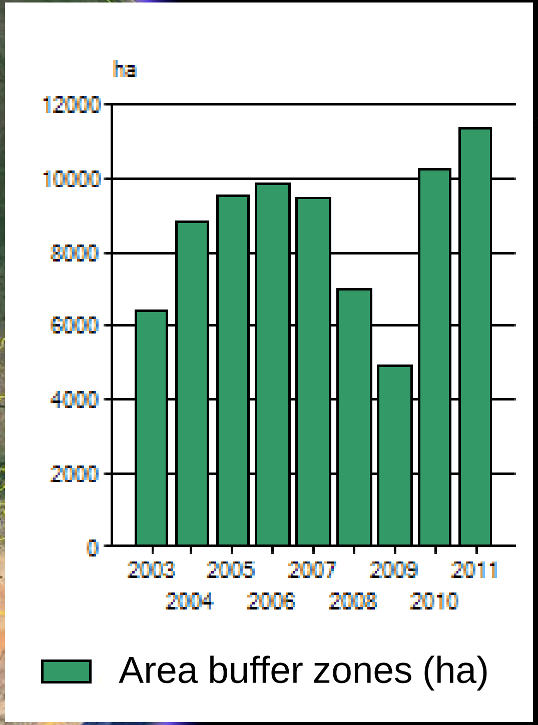
Catching phosphorus– identification of and measurements at Critical Source Areas

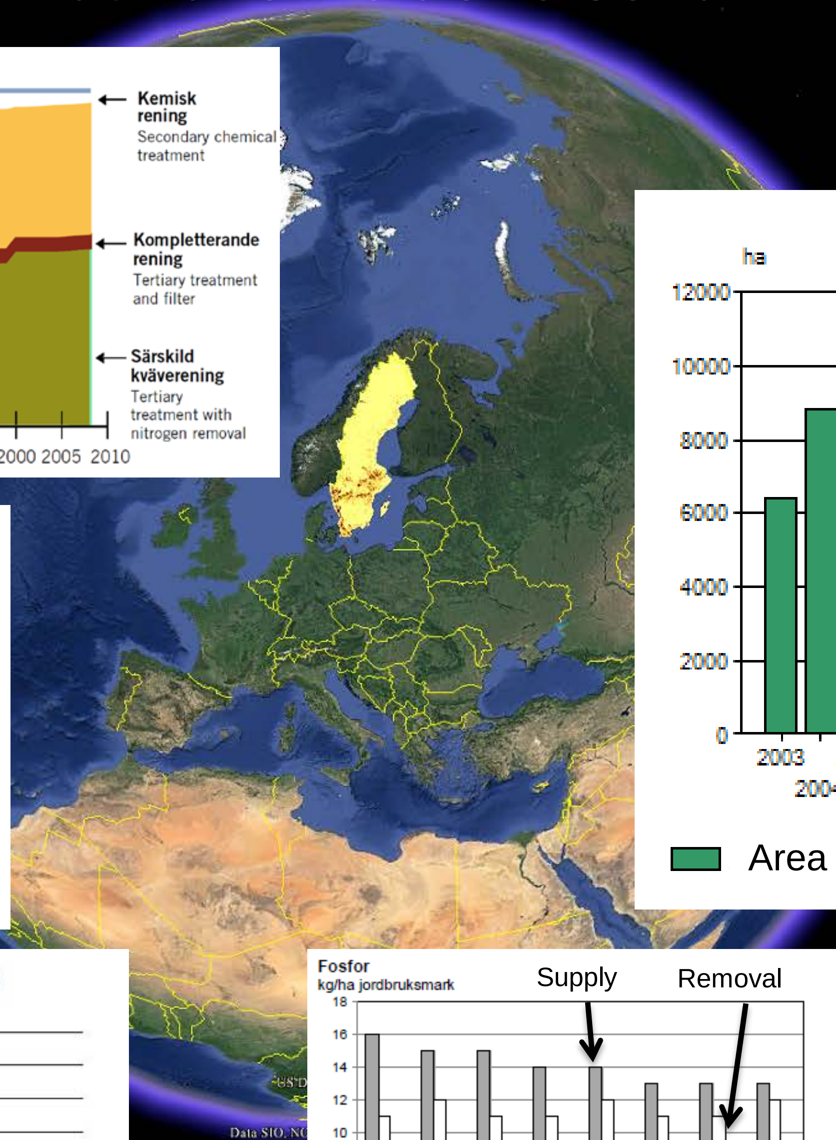
Faruk Djodjić

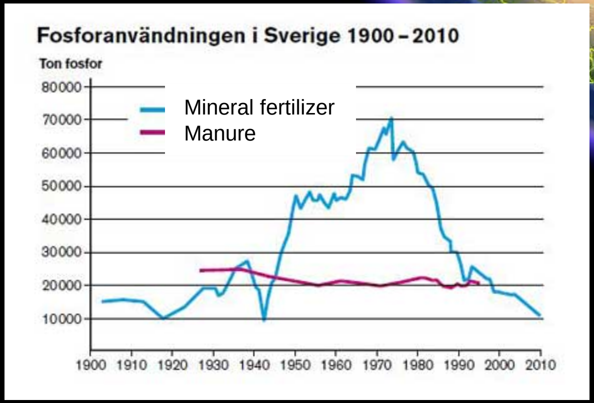
What have we done so far?

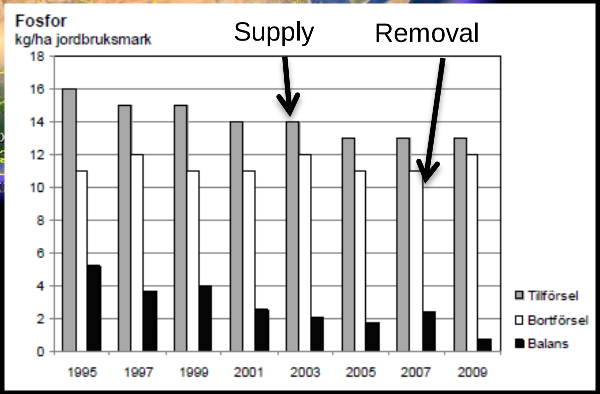












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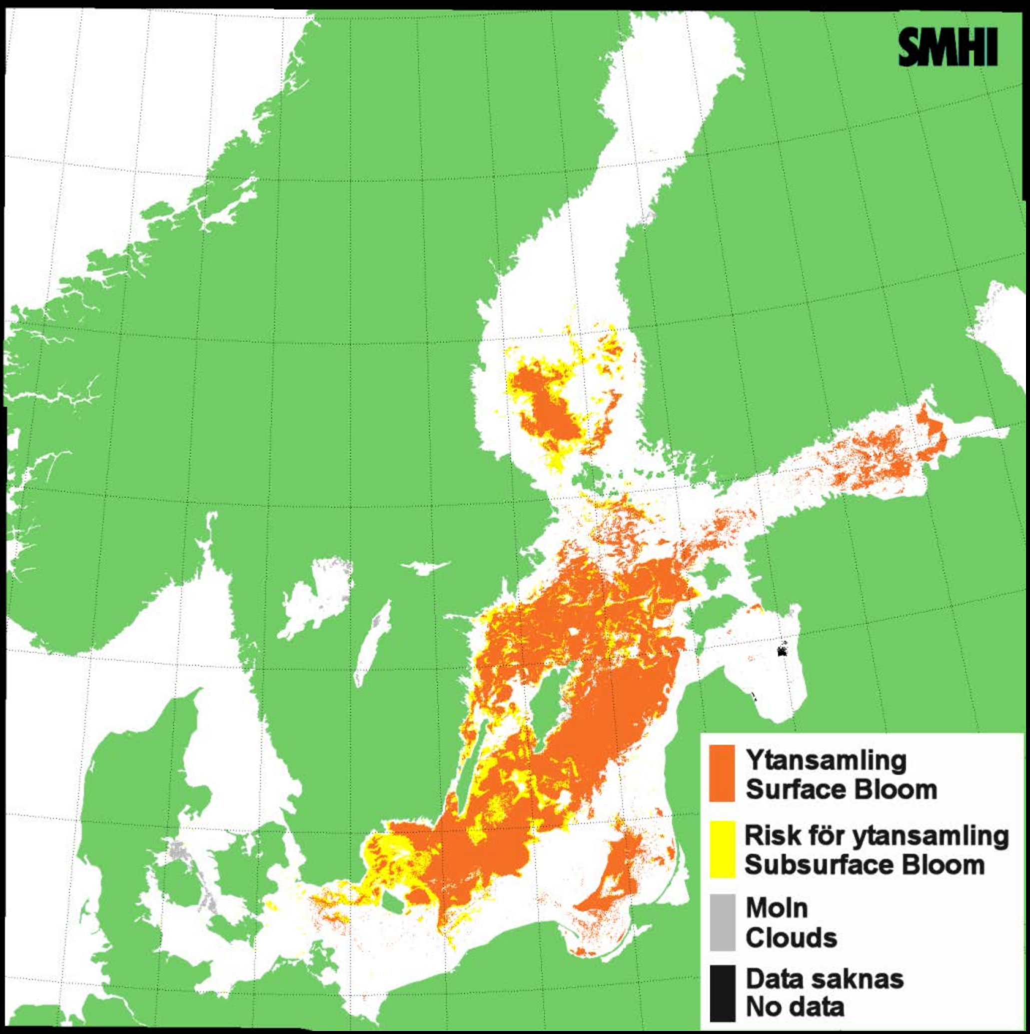
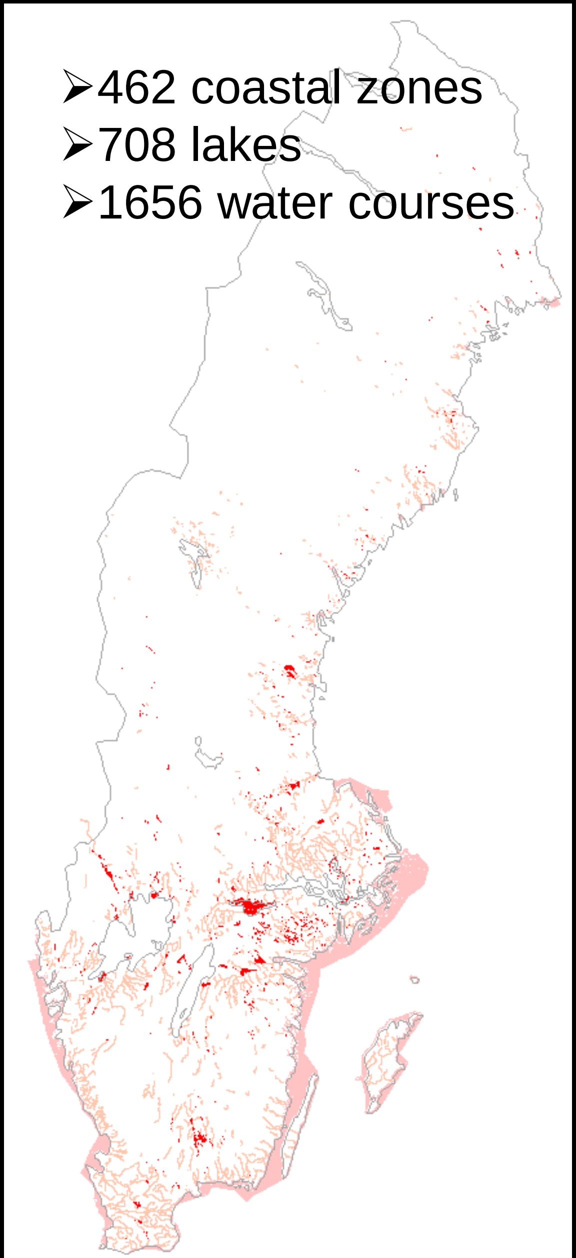
Status

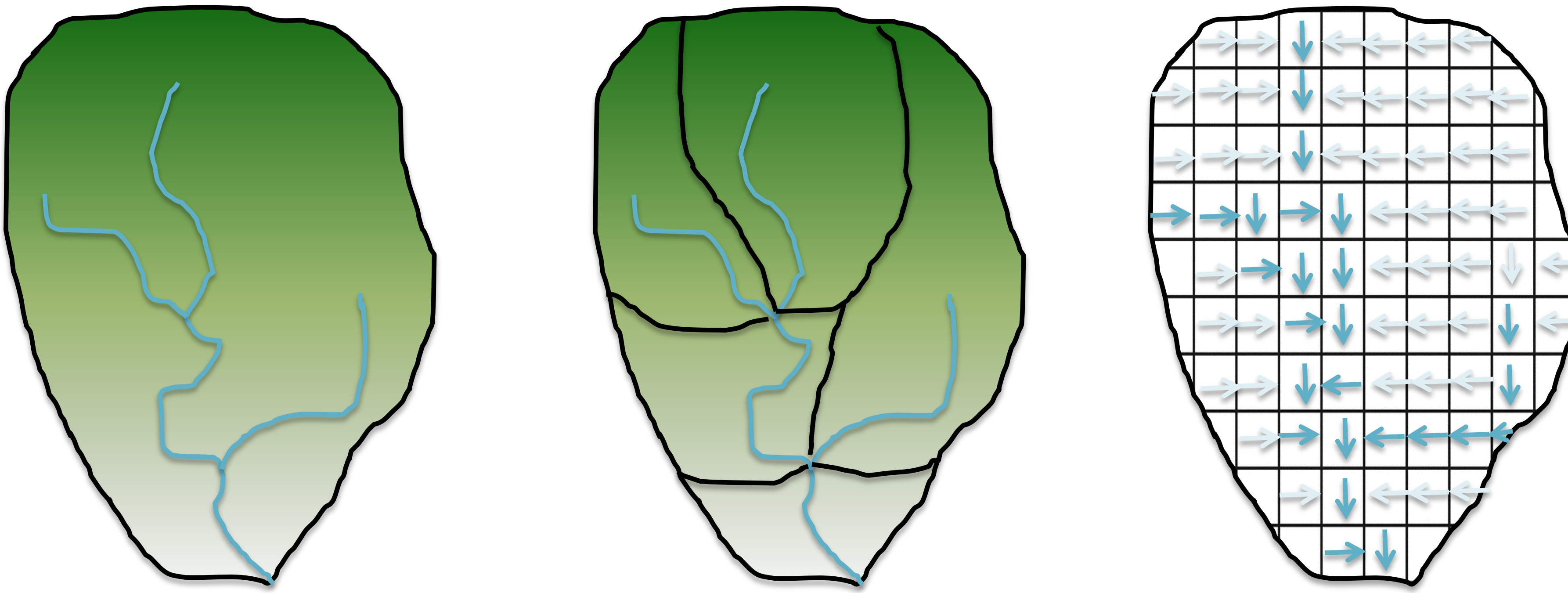


- 462 coastal zones
- 708 lakes
- 1656 water courses



- Diffuse losses … are not so diffuse
  - 90 : 10 : 1
  - 80/20
  - Identify the most vulnerable parts of the landscape – Critical Source Areas

Shifting focus



Why?
How much?

When &
Where?

Approach and Method

USPED

ED(r) = div qs(r) = Kt { [grad h(r)] . s(r) sin b(r) - h(r) [kp(r) + kt(r)] }

Div – divergence (tendency to act as a source or a sink)

qs(r) – sediment transport

Kt - transport coefficient ~ C & K

h(r) – water flow depth ~ flow accumulation

s(r) – slope

Kp – profile curvature

Kt – plan (tangential) curvature

PCRASTER – GIS programming language

+	+	+
-	+	-
-	-	-

←	←	←
→	↑	←
→	↑	←

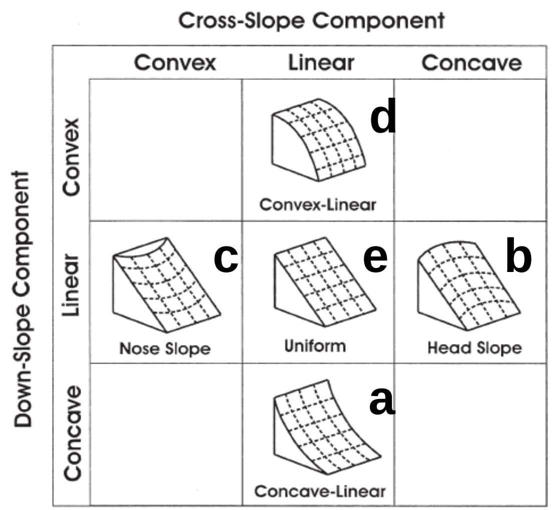


Fig. 1. Cross-slope and down-slope components of the flume experiments including naming convention. At the flume outlet all shapes were linear due to the design of the experimental box. Only components with at least one linear component could be used.

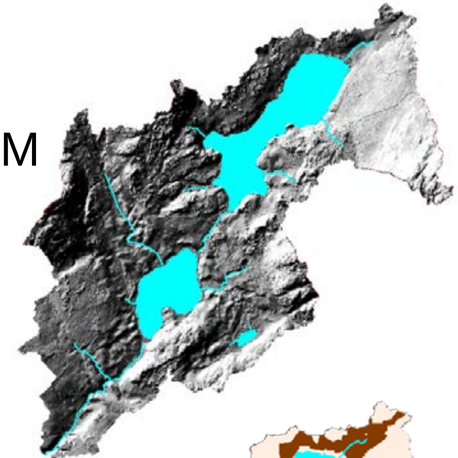
INPUT

Approach and Method

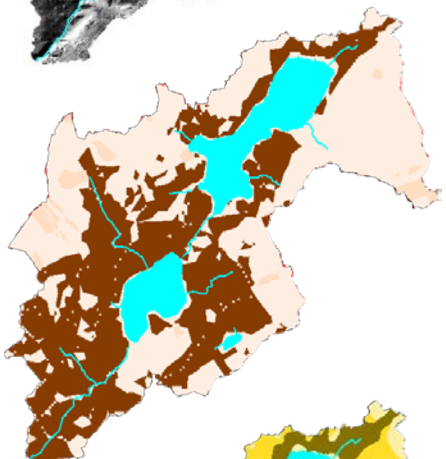
OUTPUT

R = climate / runoff effect

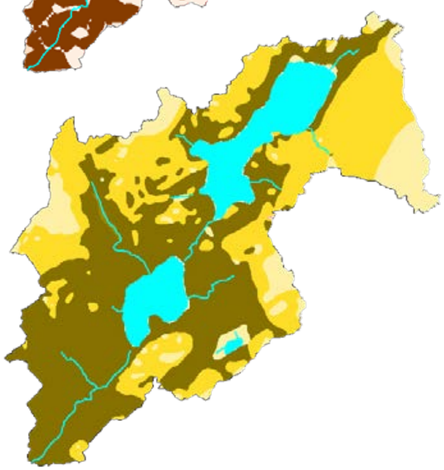
DEM

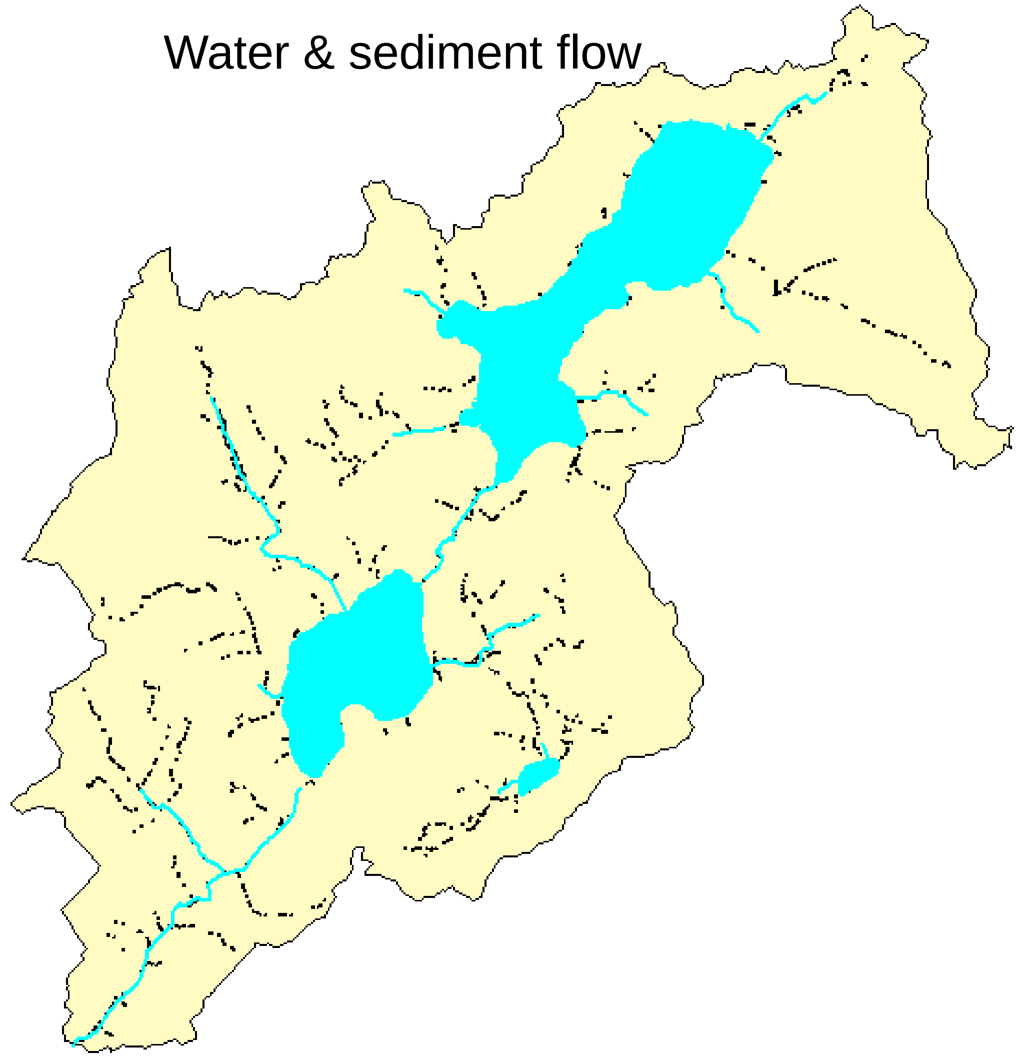


C



K





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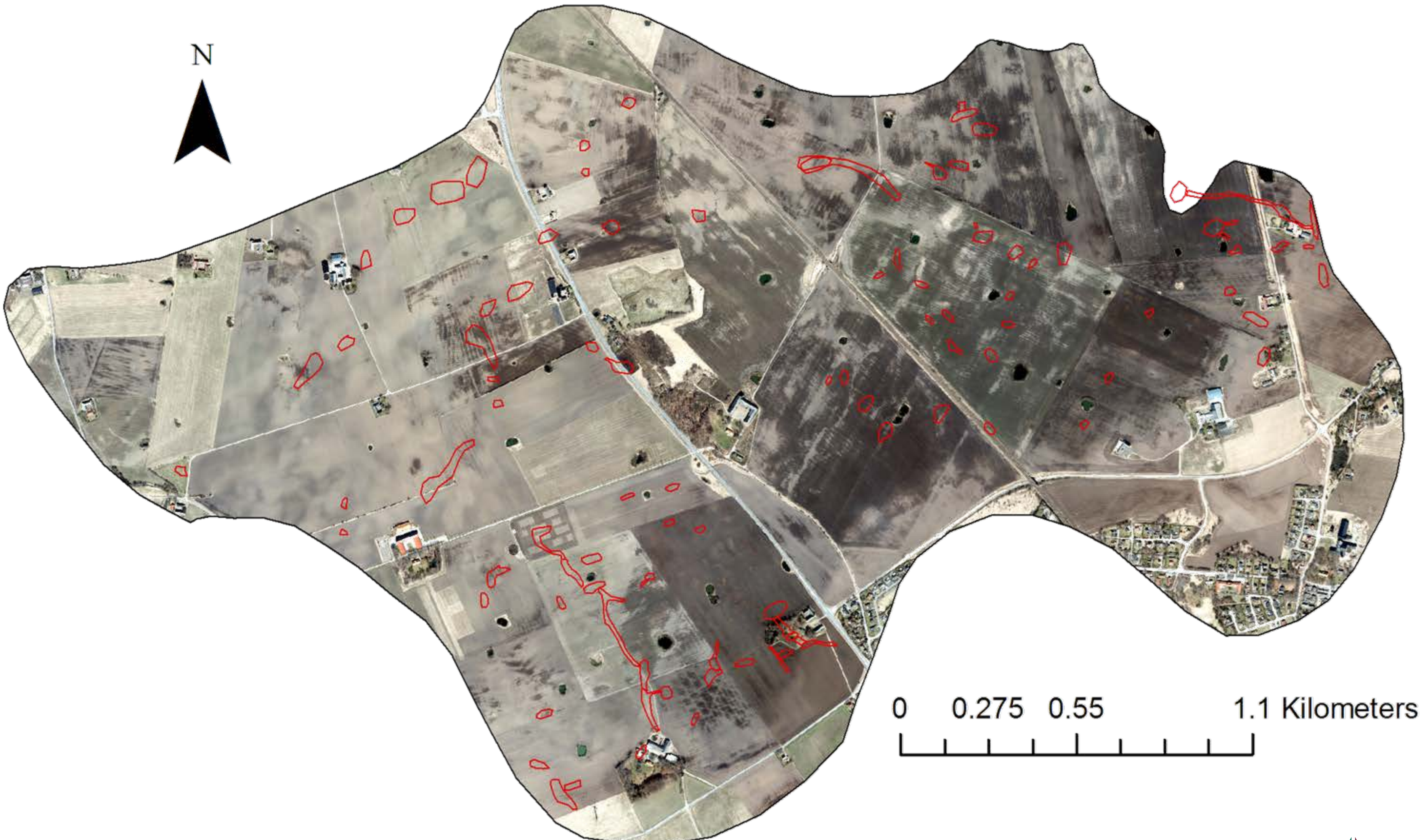
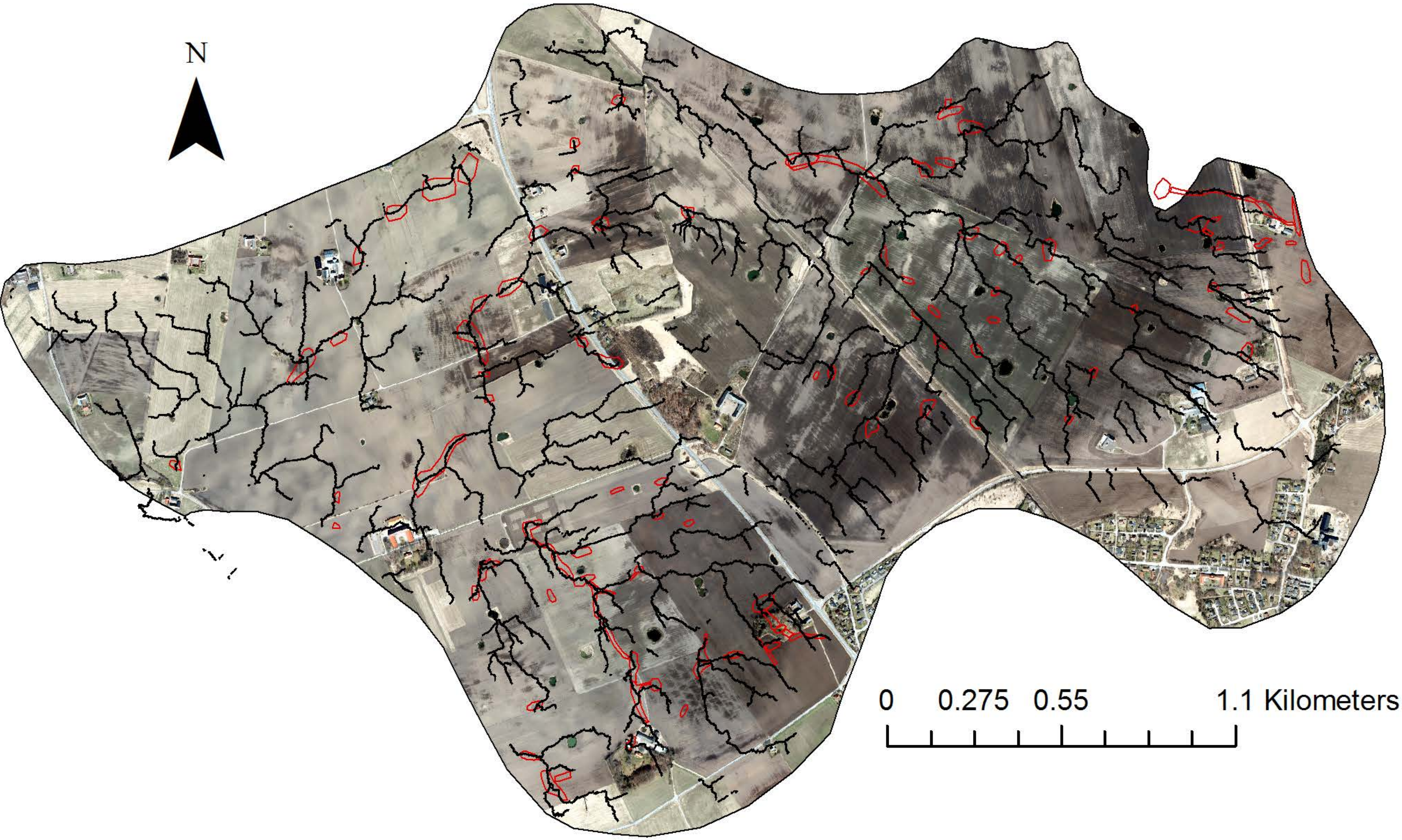
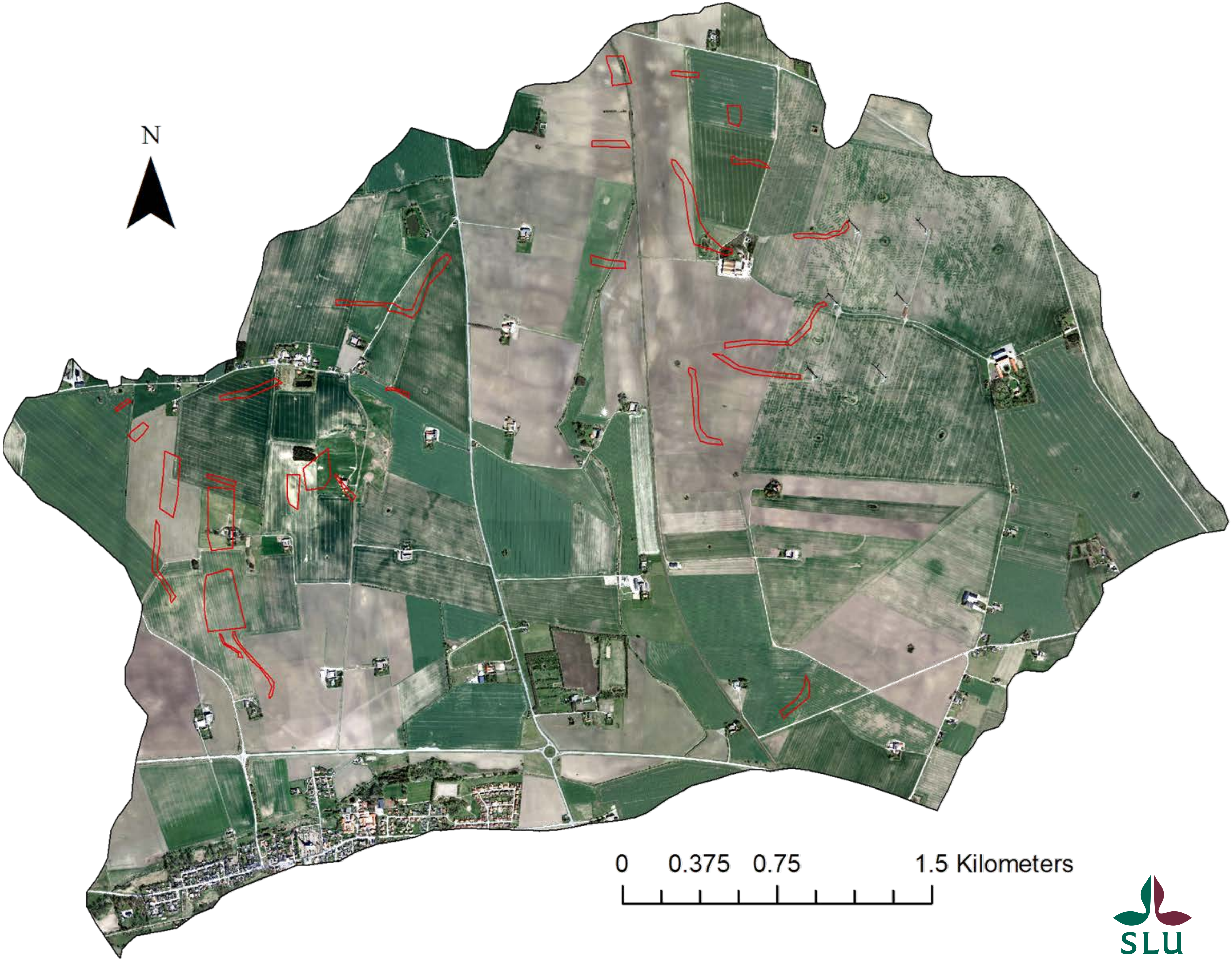

N
0
0.275
0.55
1.1 Kilometers


N
0
0.275
0.55
1.1 Kilometers


N
0
0.375
0.75
1.5 Kilometers
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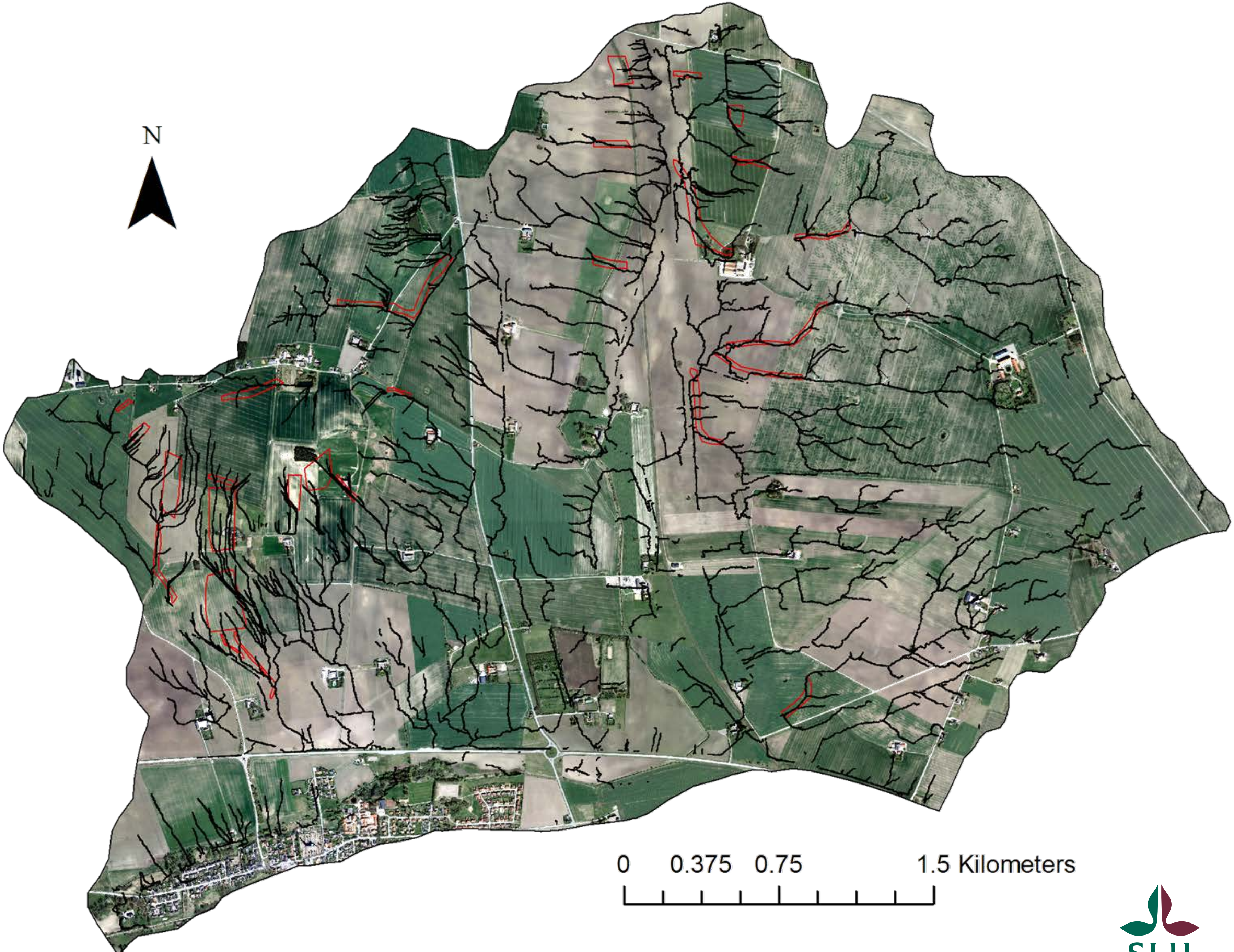

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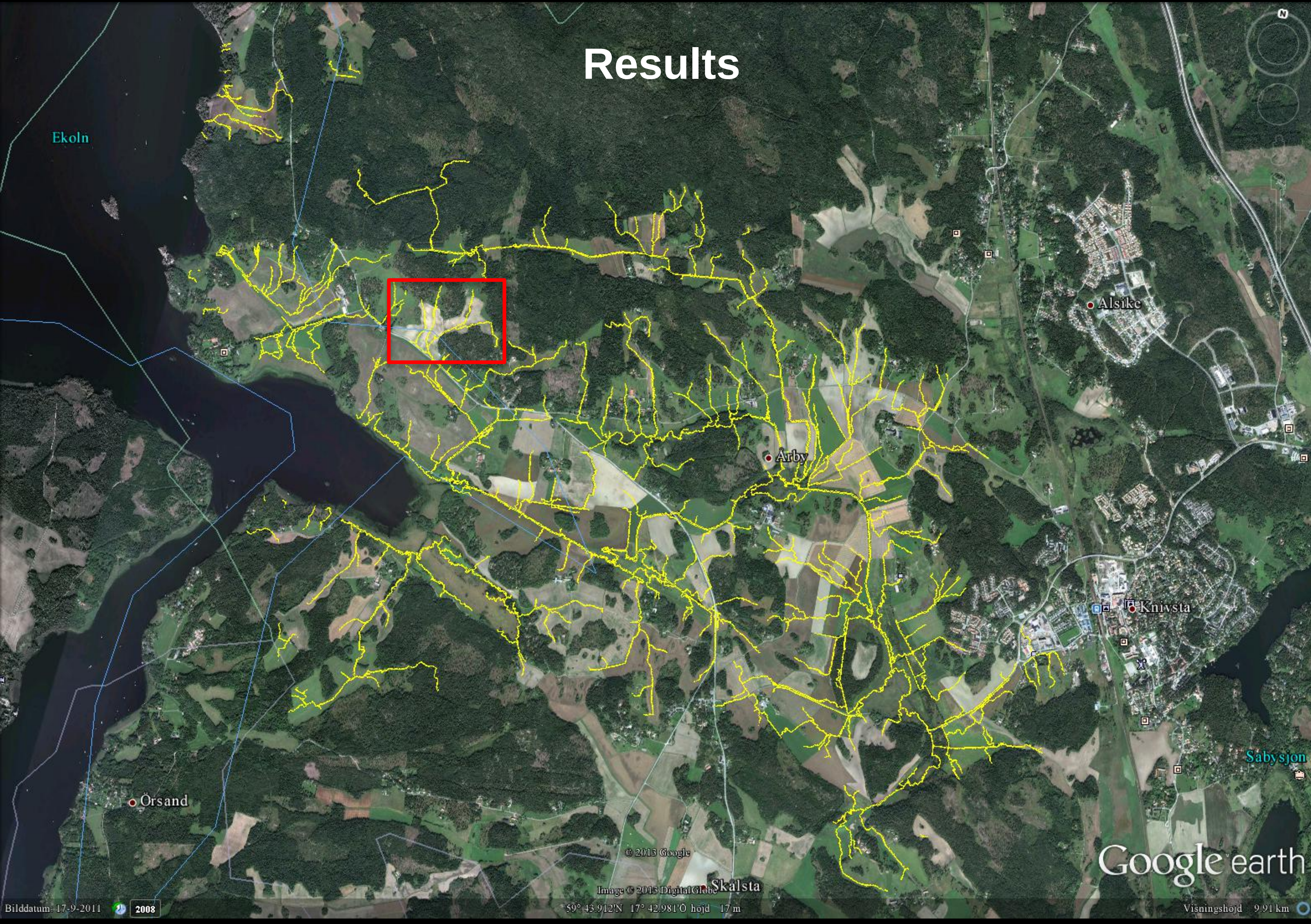
Results



Modelled surface runoff and erosion pathways in autumn 2012

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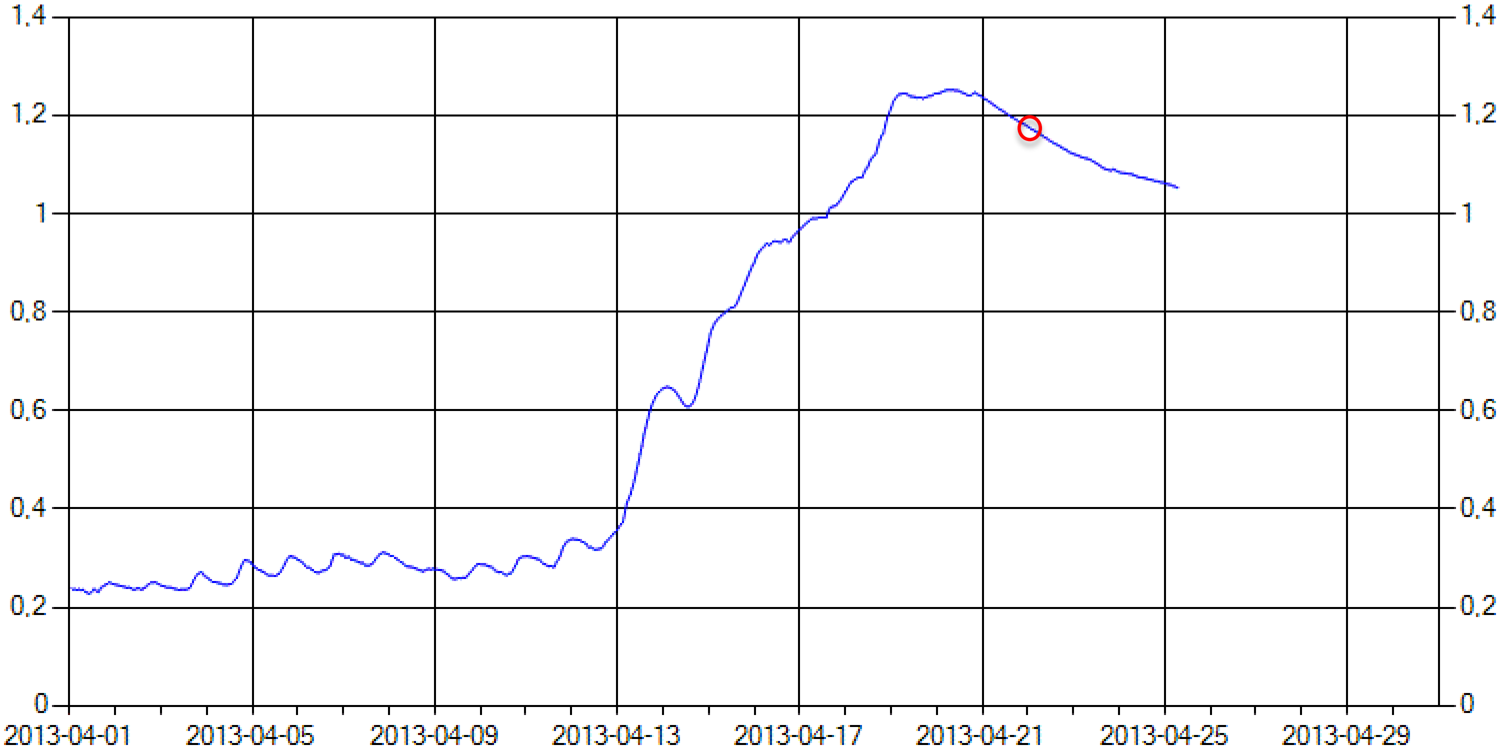
Results

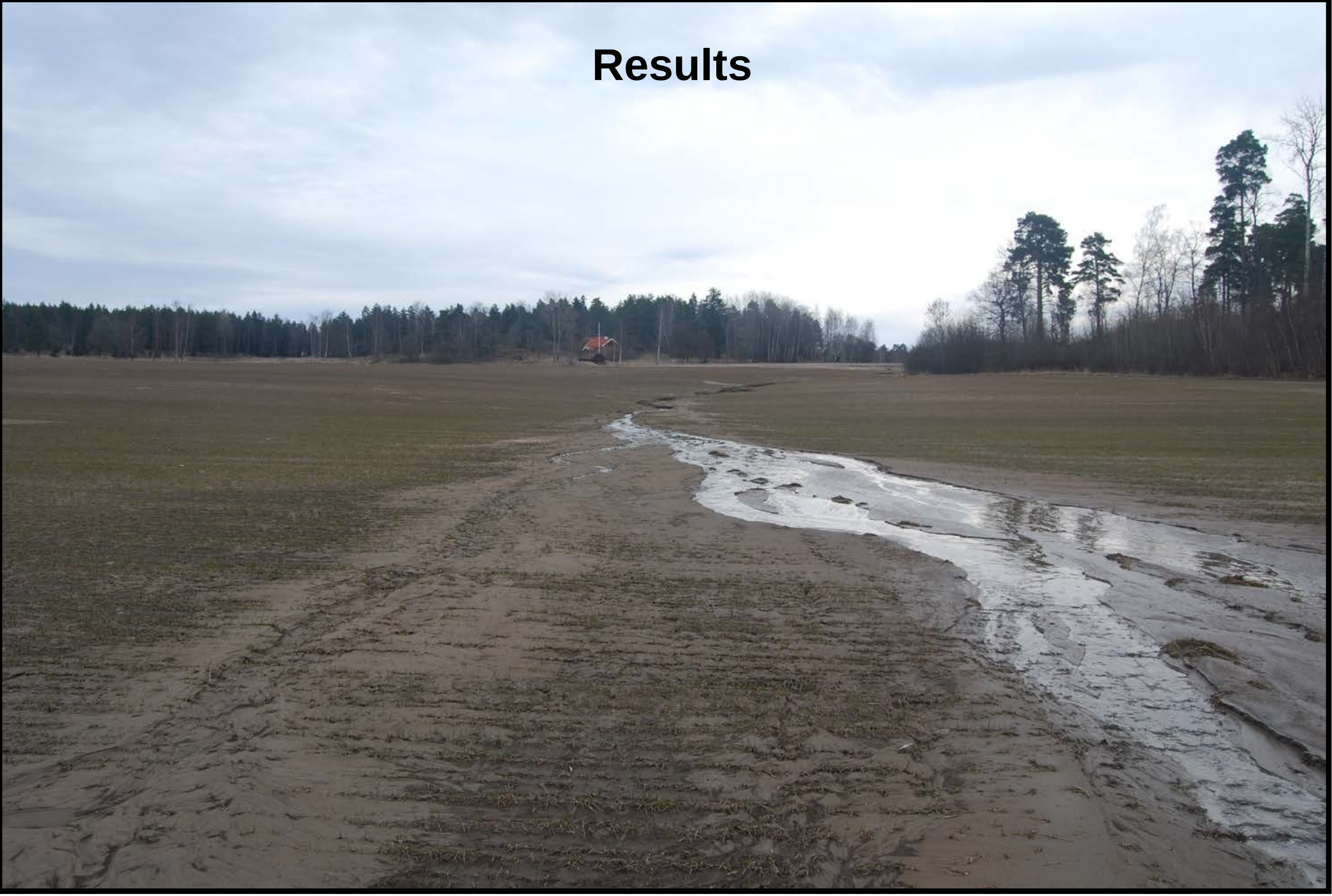
October 2012

Results

Water level in river Fyrisån (m)

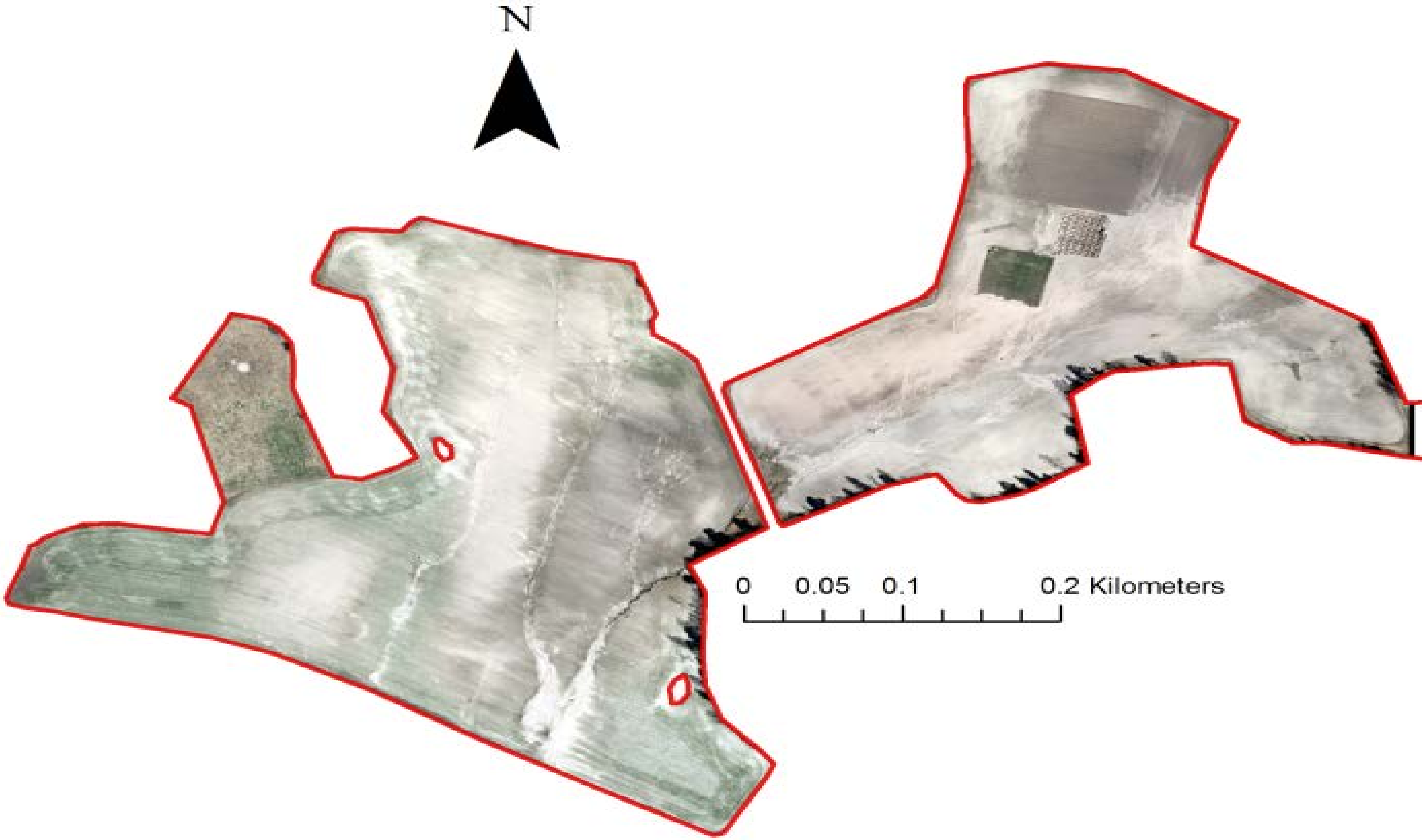


Results



Results

Results



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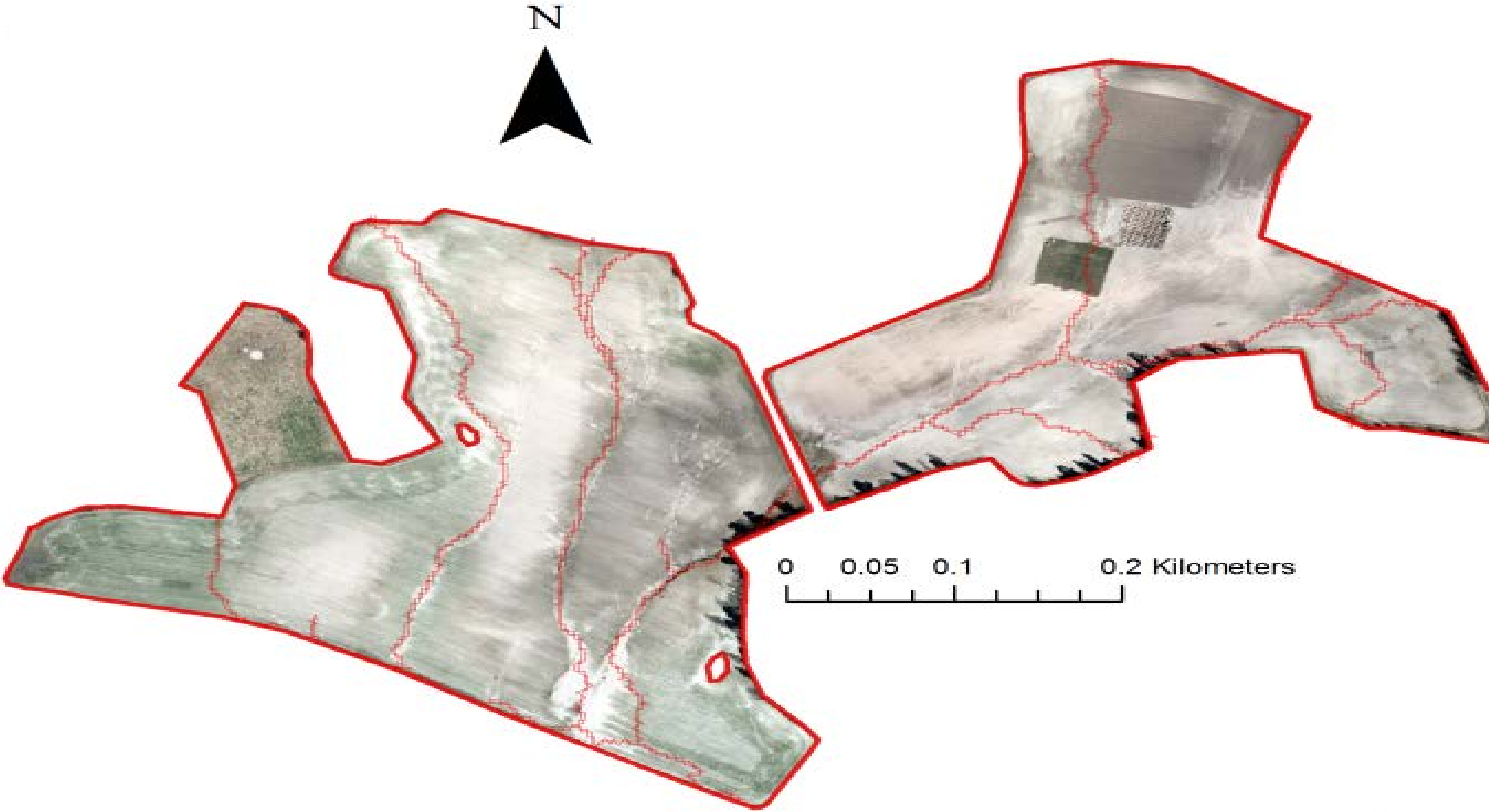
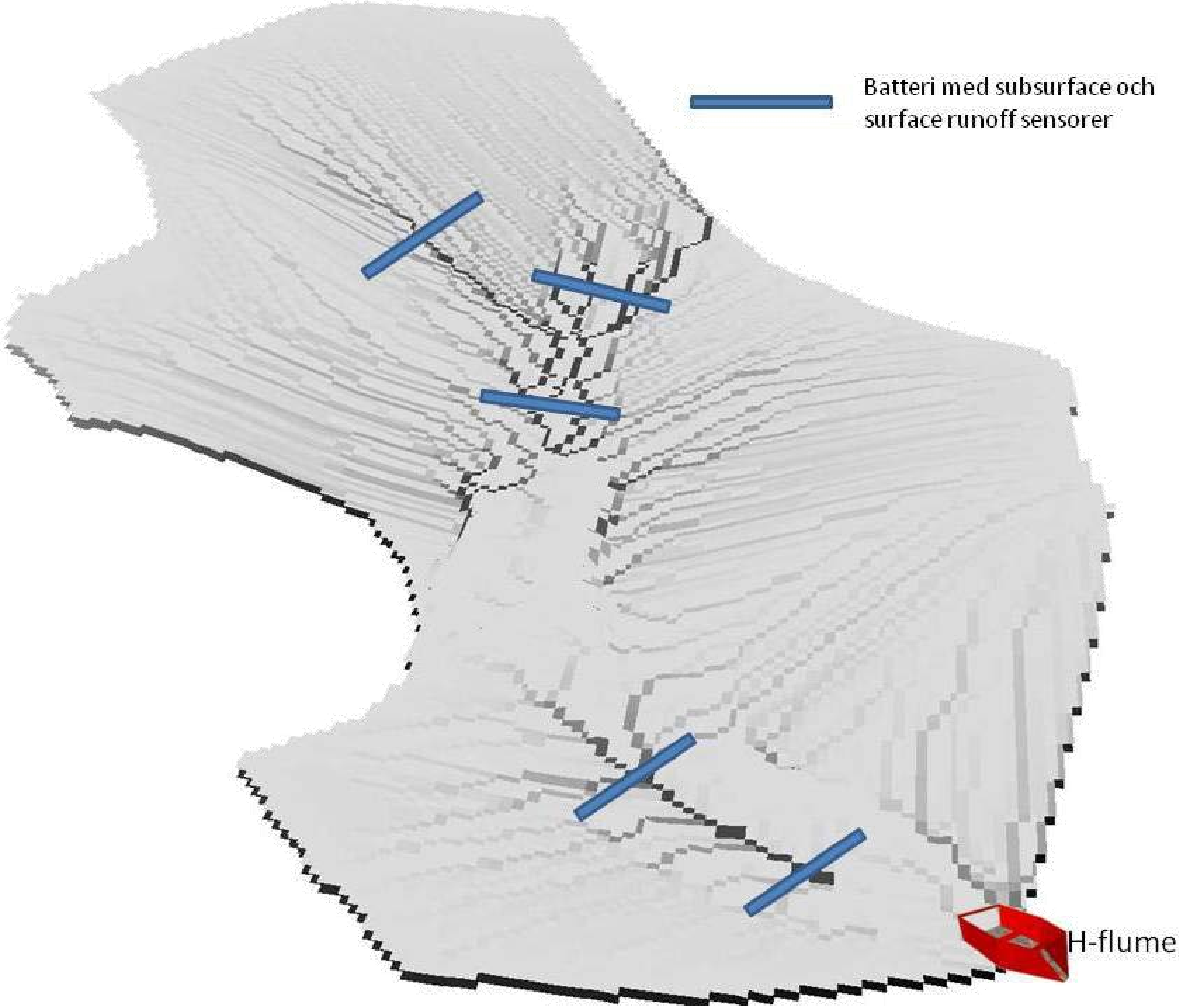

N
0 0.05 0.1 0.2 Kilometers


Batteri med subsurface och
surface runoff sensorer
H-flume

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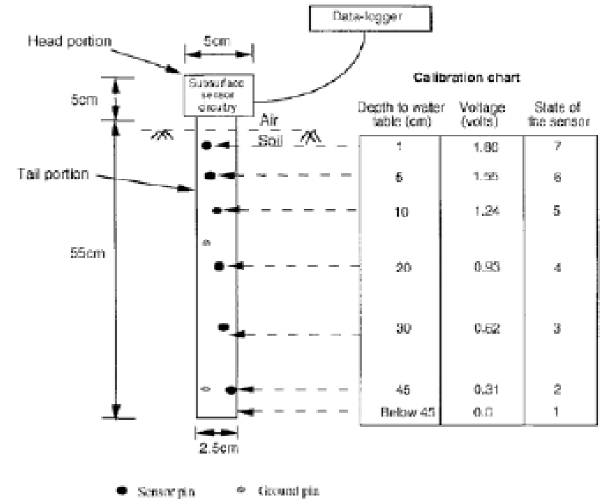
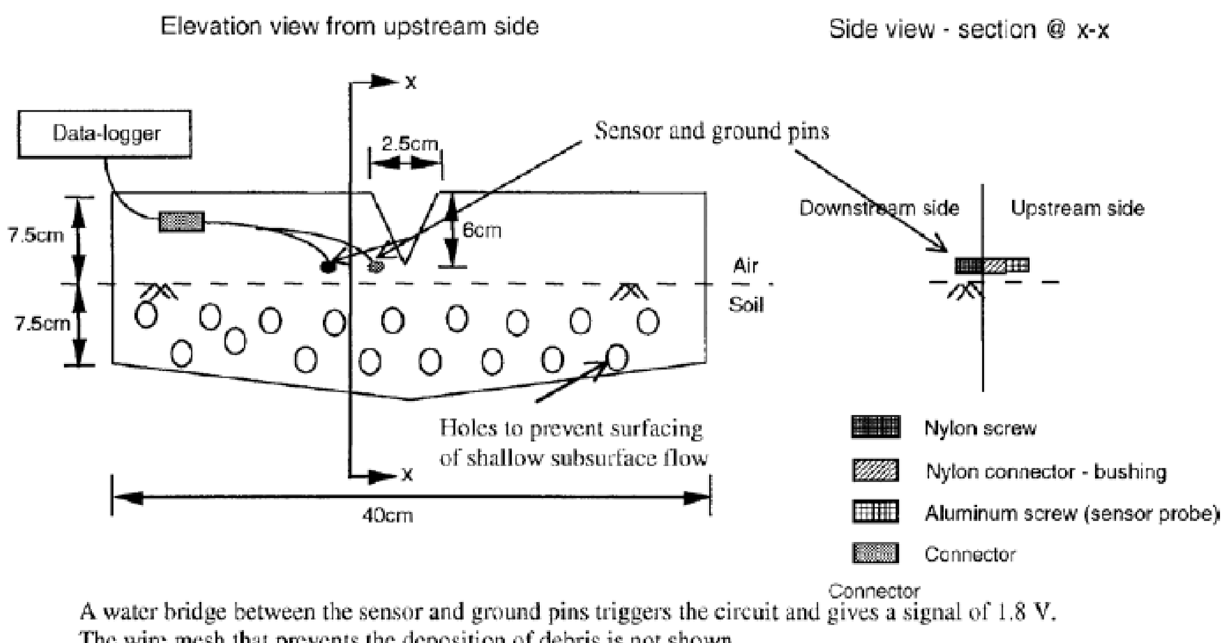


Figur 2. ”Subsurface sensor” för att mäta vattennivå under och nära markytan. Utspänningen ändras beroende på hur många mätpunkter (stift) finns under vattennivån och därmed kan spänningen omvandlas till vattennivå (Srinivasan *m.fl.*, 2000).



Figur 3. ”Surface runoff” sensor som en miniatyr triangulärt överfall, en "ja-nej" givare som indikerar ytavrinningens förekommer när vattennivå stiger över givarens stift (”pin”), (Srinivasan *m.fl.*, 2000).

H-flume with a ”Ultrasonic flowmeter”, at a field in Skaterud catchment, Norway
(Photo: Faruk Djodjic).

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Instead of conclusions

- If a picture is worth a thousand words…
- …is a map worth a thousand numbers?
- LIDAR data is already available for large parts of Sweden
- Better soil maps also available
- Knowledge regarding soil erodibility increases
- High resolution crop distribution with IAKS data
- Search first where the light is on, and measure there
- Water (and SS, and P) does run downhill…

THANKS FOR YOUR ATTENTION!!!

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