NIBIO
NORSK INSTITUTT FOR BIOØKONOMI

Forsker Prosjekter om sikring skog mot skred

RISK Webinar 13/02/2026

Paul McLean

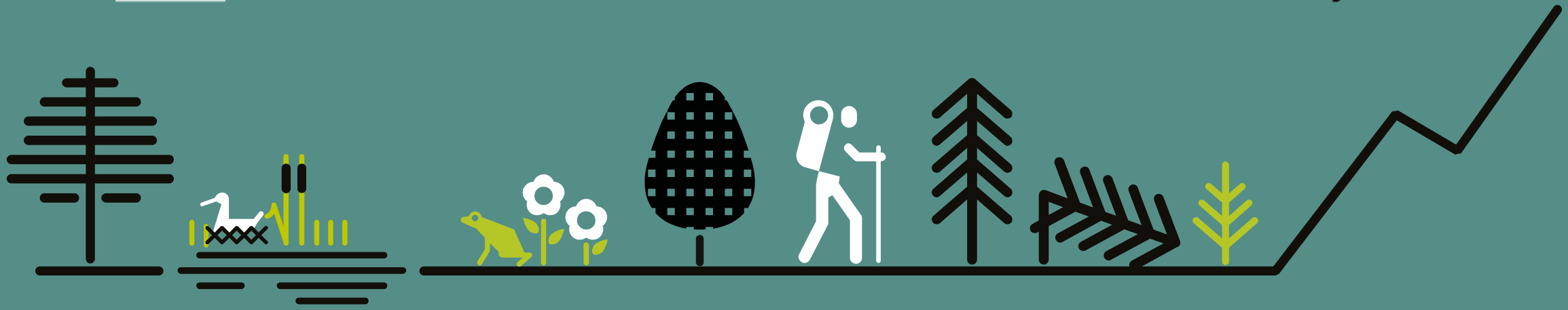
Precilience

Co-funded by the European Union

precilience.eu

Fortress

The Research Council of Norway



Kort oversikt

Precilience

EU Prosjket

Skog og jordbruk

Klimatilpassning

Oppgave om jordskred

Fokus på demonstrasjon, ikke ny kunnskap

Fortress

Norsk prosjekt

Sikring skog mot snø og jord skred

Fokus på ny kunnskap

Begge har mulighet til samarbeid!

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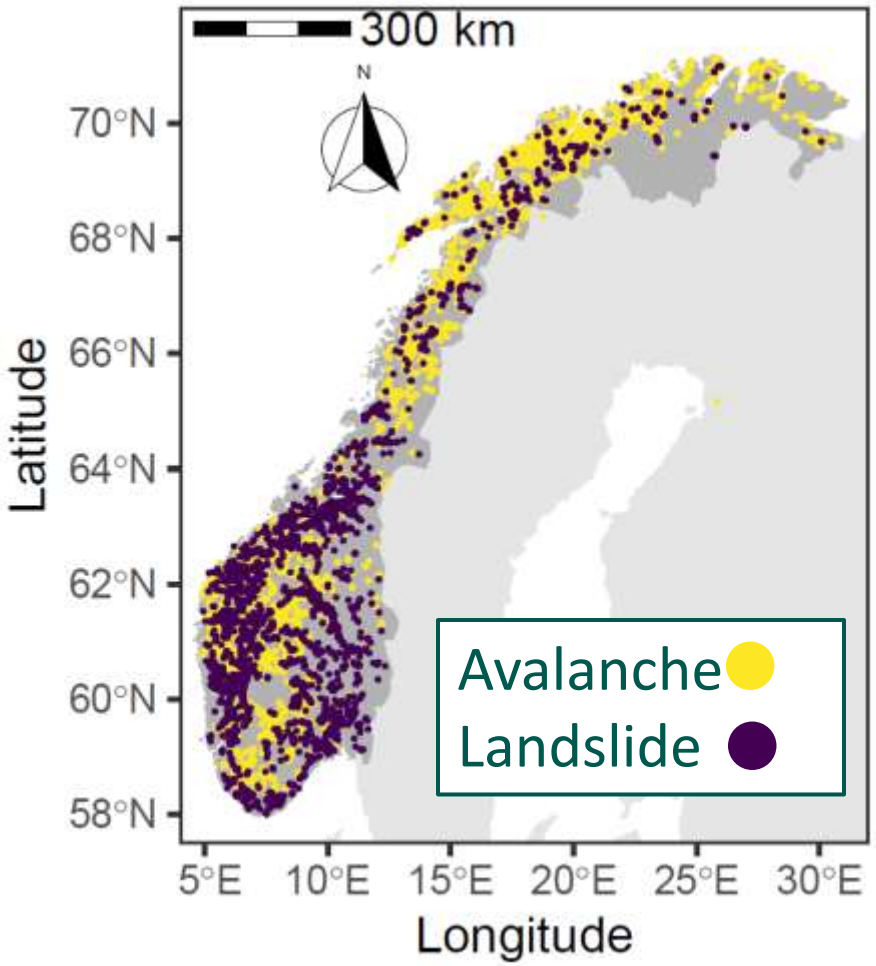
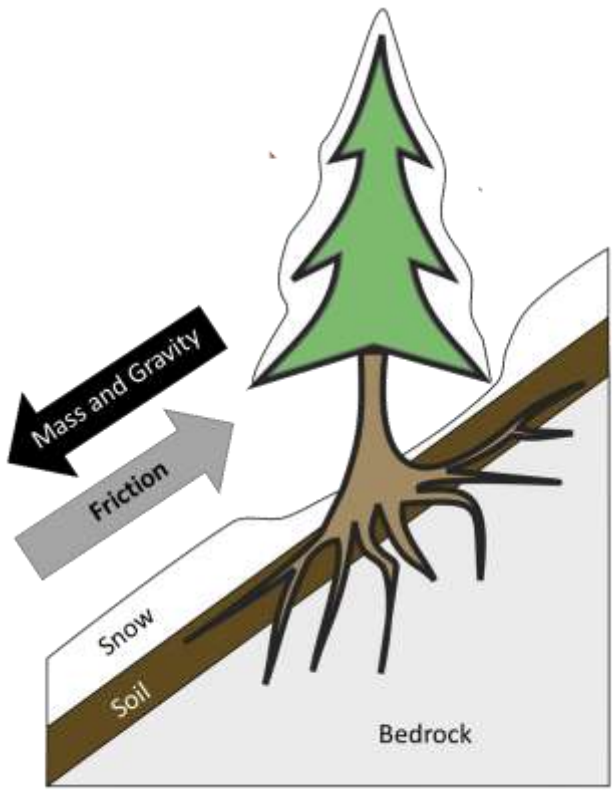
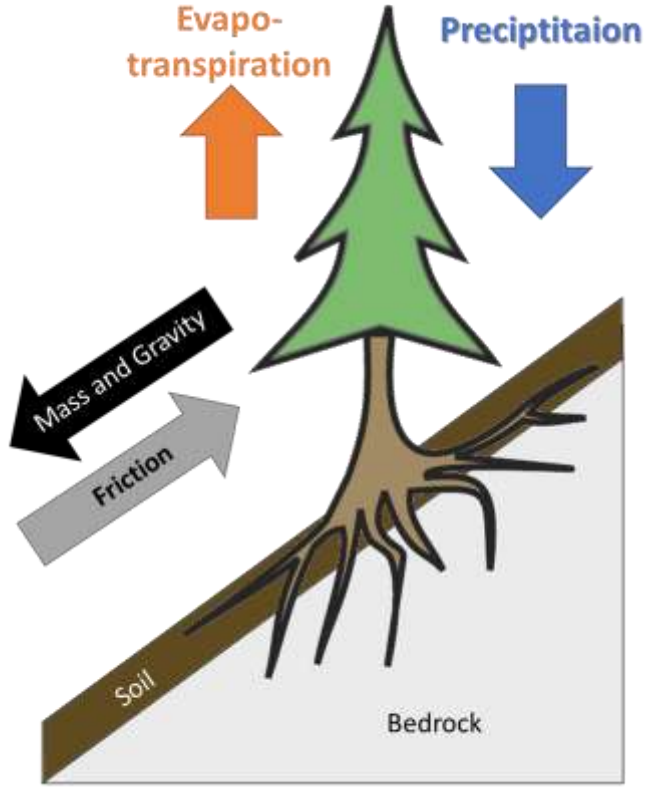
Nøkkel info

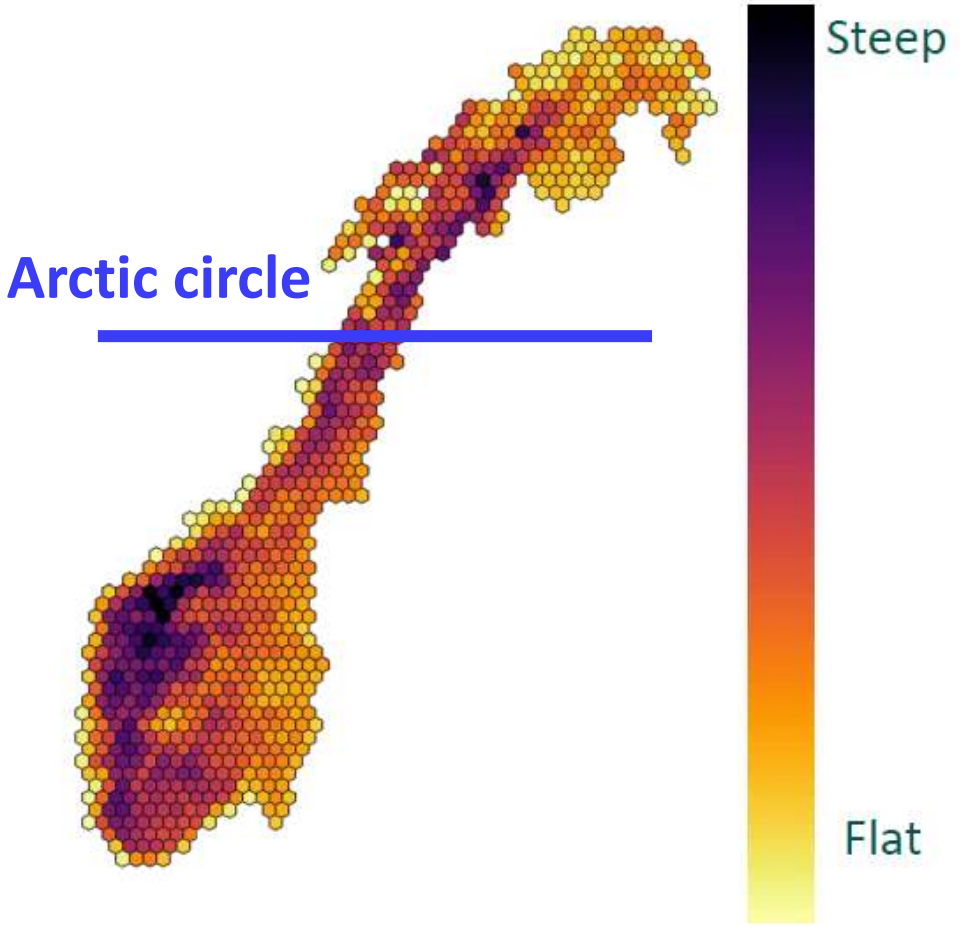
- Prosjekter er om skog mot skred, ikke skogsbilvei
- FORTRESS sokker på mekanismes at skog forhindre jordskred
- PRECLIENCE etablere demonstrasjoner av skjøtsel relevant til sikring skog
- Vi ønsker samarbeid mellom prosjekter, og med dere…
- Vi ønsker langsiktig feltforsøk i skogen

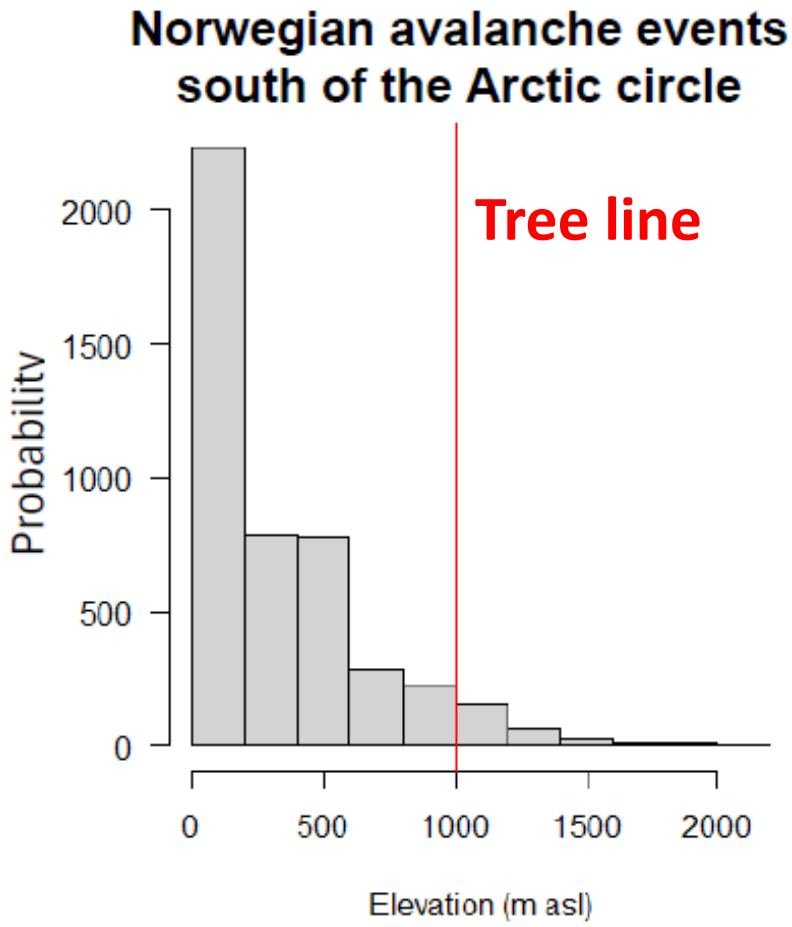
Skogseffekt mot snø- og jordskred







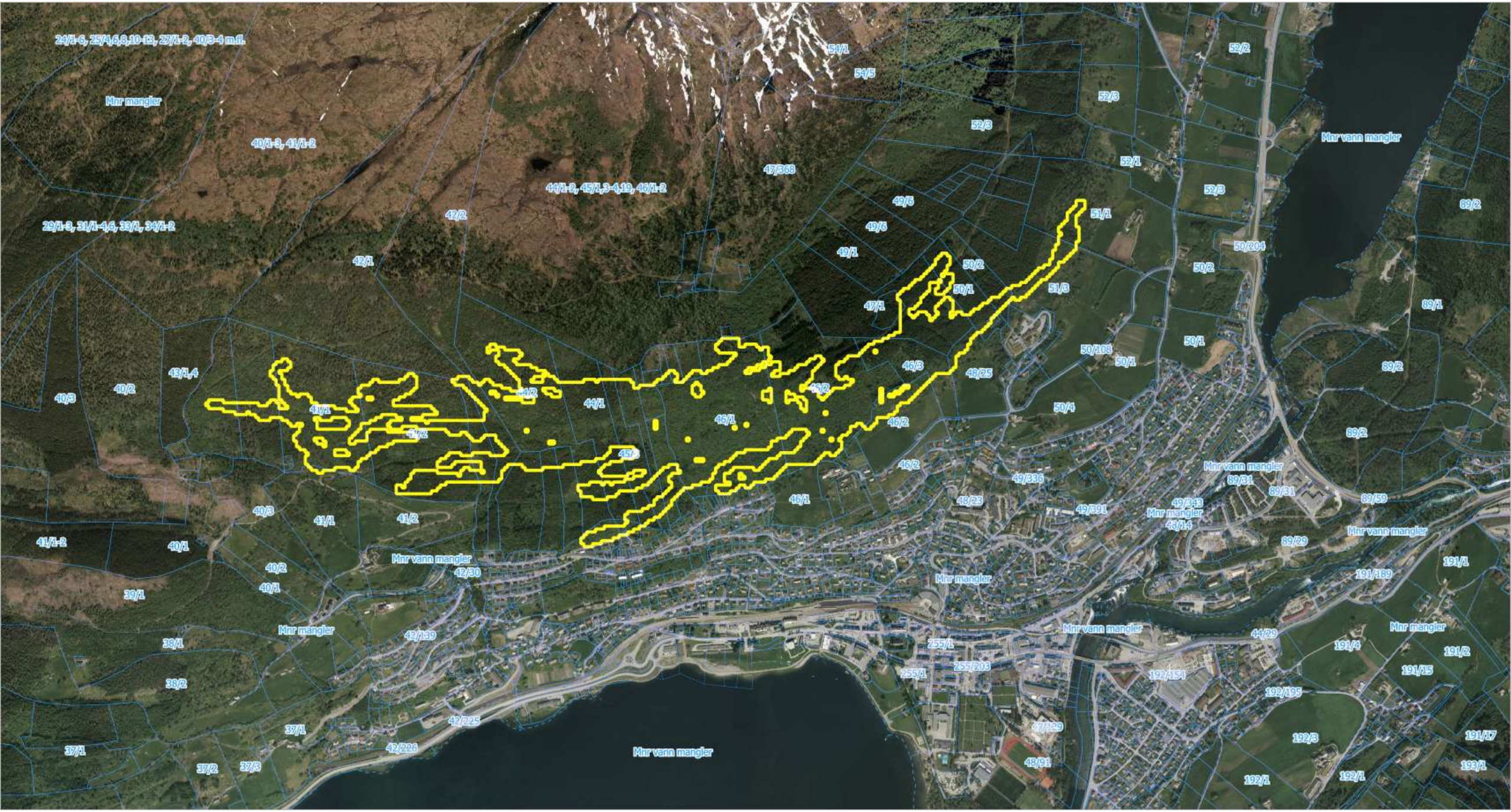

Arctic circle
Steep
Flat


Norwegian avalanche events
south of the Arctic circle
Tree line
Probability
2000
1500
1000
500
0
0
500
1000
1500
2000
Elevation (m asl)

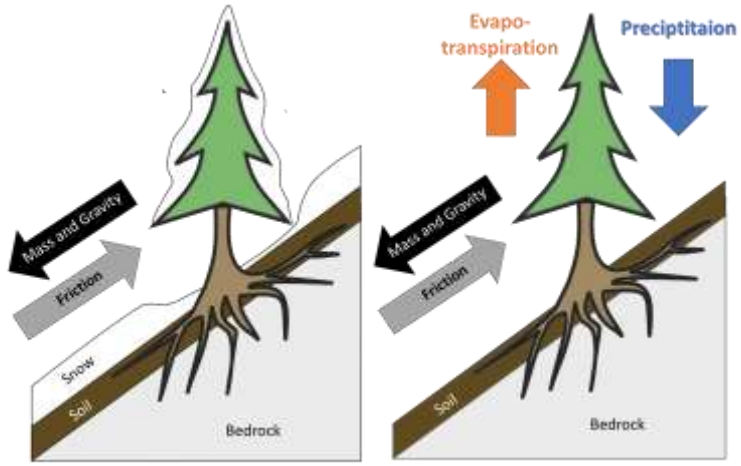
Species	Area (Ha)	Volume (m^3)
Spruce	21.5	13096
Pine	3.7	647
Birch	43.4	6370

13 Schools (inc Nurseries)
714 Permanent residences
3.5 km Railway & Station
….
Etc.

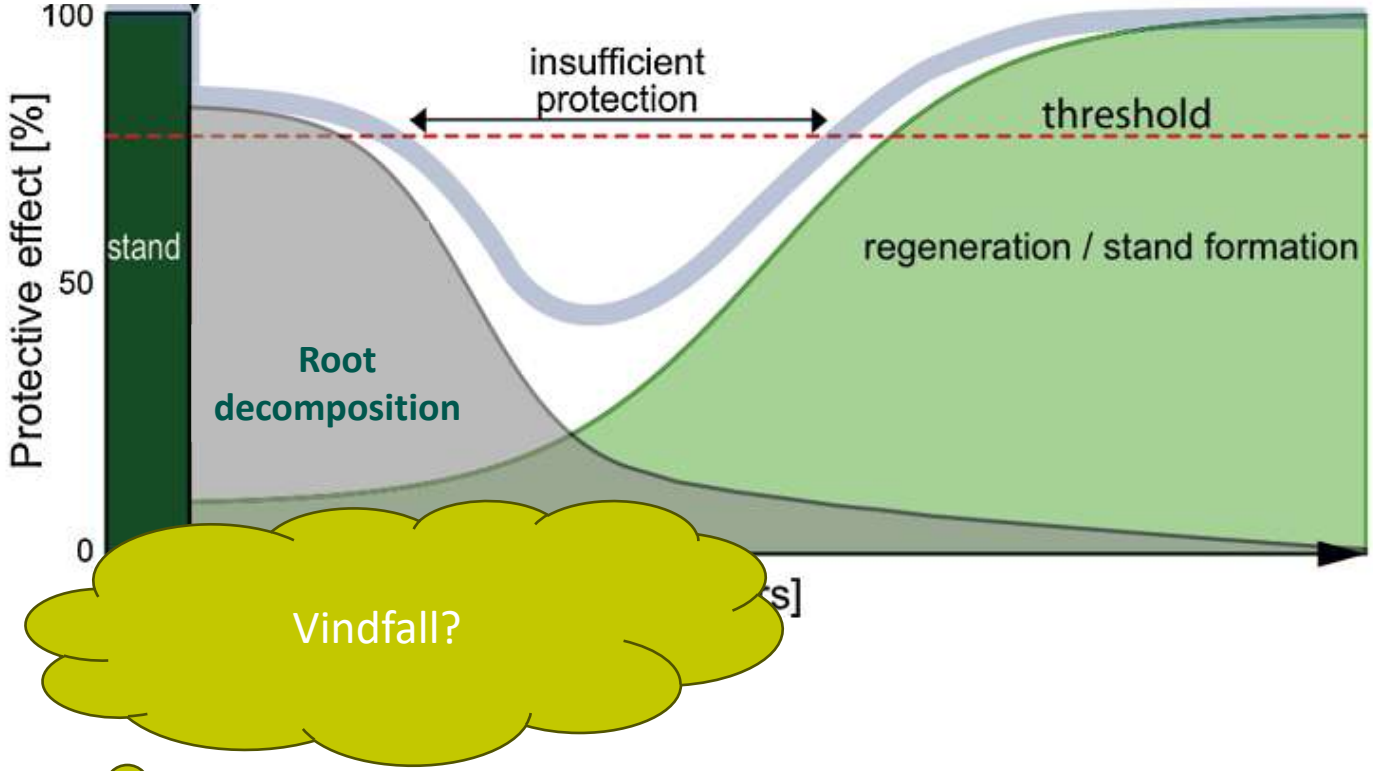
Runout without forest
Runout with forest
Protection forest


24/1-6, 25/4,6,8,10-13, 27/1-2, 40/3-4 m.fl.
Mnr mangler
40/1-3, 41/1-2
29/1-3, 31/1-4,6, 33/1, 34/1-2
44/1-2, 45/1,3-4,19, 46/1-2
47/368
54/1
54/3
52/2
52/3
52/1
Mnr vann mangler
89/2
89/1
51/1
49/5
49/6
49/1
42/2
42/1
50/2
50/1
47/1
51/3
50/204
50/103
49/25
46/3
43/1,4
40/3
40/2
41/1
44/2
44/1
45/1
46/2
50/4
89/31
89/59
49/336
49/23
49/391
49/343
43/14
89/29
191/1
191/189
191/4
191/2
191/15
192/154
192/195
192/3
191/17
193/1
192/1
41/1-2
40/1
41/2
42/30
39/1
38/1
38/2
42/139
42/225
42/226
37/1
37/2
37/3
255/1
255/203
49/91

Flatehogst og “Protection Gaps”

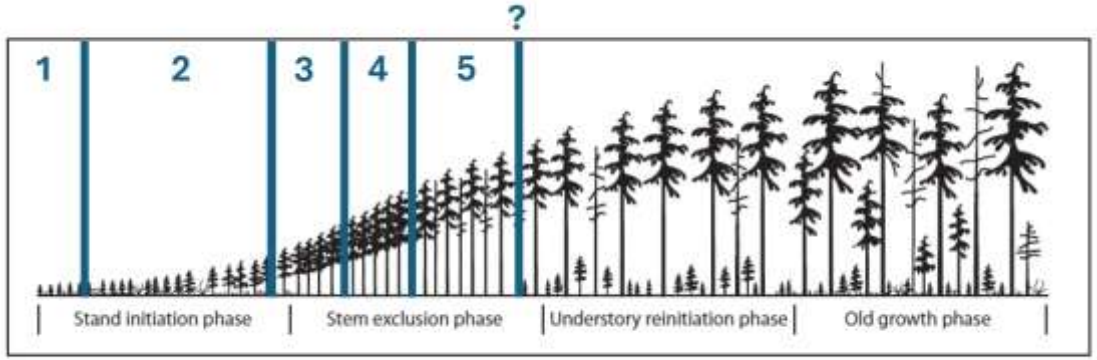


Clearfell



Vindfall?

Norwegian Maturity Classes



Adapted from **Oliver, C.D. and B.C. Larson. 1990.** Forest Stand D
McGraw Hill, NY. 467 p.

Flatehogst er et problem

Modified from Wohlgemuth et al 2016, DOI 10.1007/s10342-017-1031-x

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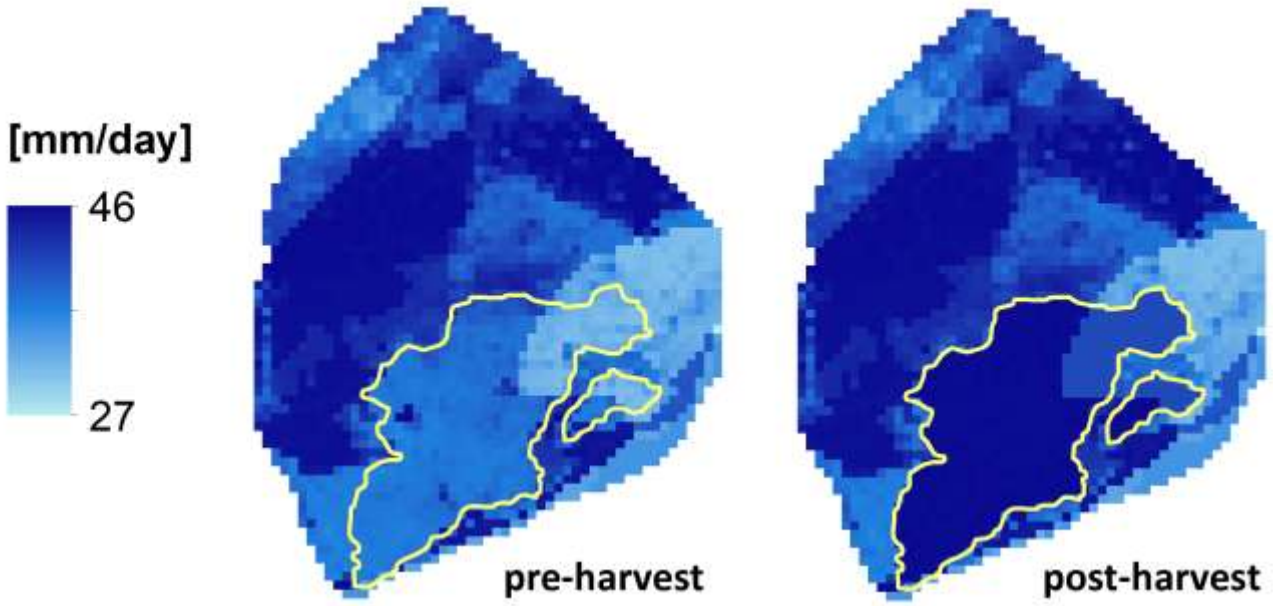
Flatehogst er et problem….også på vann


[mm/day]
46
27
pre-harvest
post-harvest


Sweden
Norway

Grenser til skogseffekt - Jølster 2019

Utgangspunkt

- Regler og forvaltningsmodeller kommer
  - Basert på erfaring fra ander land

- Vi må gå over til hogst med mindre inngrepp
  - Taubane
  - kontinuerlig skogdekke

- Vi må se hvordan dette kan fungere i praksis (**Precilience**), og vi må ikke forstå hvor og hvordan vi kan anvende det bedre (**FORTRESS**).

Precilience

Precision solutions for climate resilience

Using science to help food and forest production adapt to a changing climate

Project lead: Petteri Karisto
Natural Resources Institute Finland

Co-funded by
the European Union

precilience.eu

Precilience

Co-funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under the grant agreement number 101157094.

Precision solutions for climate resilience

Where we work

Denmark
1 Vestjylland
2 Østjylland

Estonia
3 Lääne-Eesti
4 Lõuna-Eesti
5 Põhja-Eesti
6 Kesk-Eesti

Finland

South Finland
7 Kymenlaakso
8 Etelä-Karjala
9 Varsinais-Suomi

West Finland
10 Satakunta

Norway

Oslo and Østfold
11 Østfold

Innlandet
12 Innlandet

Trøndelag
13 Trøndelag

Sweden

Småland and islands
14 Kalmar
15 Gotland

South Sweden
16 Skåne

West Sweden
17 Halland

Örebro (East Mid)
18 Örebro

https://www.precilience.eu/

https://www.nibio.no/en/projects/precilience-precision-climate-resilience-for-agriculture-and-forestry-sectors-in-the-european-boreal-regions

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Project Structure

WP1 - **Locally identified multi-risks and opportunities for agriculture and forestry**
(Mikko Peltoniemi LUKE)

WP2 - **Co-design of adaptation strategies** **(Davide Cammarano, Aarhus University)**

WP3 - **Test & demonstrate transformations increasing climate resilience & adaptation in agriculture**
(Jian Lui, NIBIO)

WP4 - **Test & demonstrate transformations increasing climate resilience & adaptation in forestry**
(Rein Drenkhan, Estonian University of Life Sciences)

WP5 - **Coordination of collaboration and commercialisation** **(Paloma Hannonen, Luontoa Ltd)**

Video

https://www.precilience.eu/

vi kan ikke fortsette å gjøre ting på samme måte!

WP4 tasks

How forest characteristics help forests against damages?
More diverse forests and suitable practices (Task 1), Lead: Markus Melin, LUKE

How to support mixed forest regeneration (resilience for the future)?
Minimizing risks through regeneration (Task 2), Lead: Eeva Terhonen, LUKE

CCF or clear-cut?
Forest health, regeneration and productivity (Task 3), Lead: Jürgen Aosaar, EMÜ

The best tree genotypes for future climate? (Task 4), Lead: Malin Elfstrand, SLU
Genetic variation: growth and survival of spruce and pine from different regions,.

Demonstrations in 4 countries: Estonia, Finland, Sweden and Norway

Photos: Precilience project partners

WP4: Test & demonstrate transformative solutions increasing climate resilience & adaptation in forestry

WP4's overall objective: Enable the wide-spread use and upscaling of transformative solutions that the forestry sector and forest-dependent livelihoods and regions need to cope with the challenges brought by changing climate. Bridge the gap between science and practice through hands-on, interactive and research-based practical demonstrations around identified core themes.

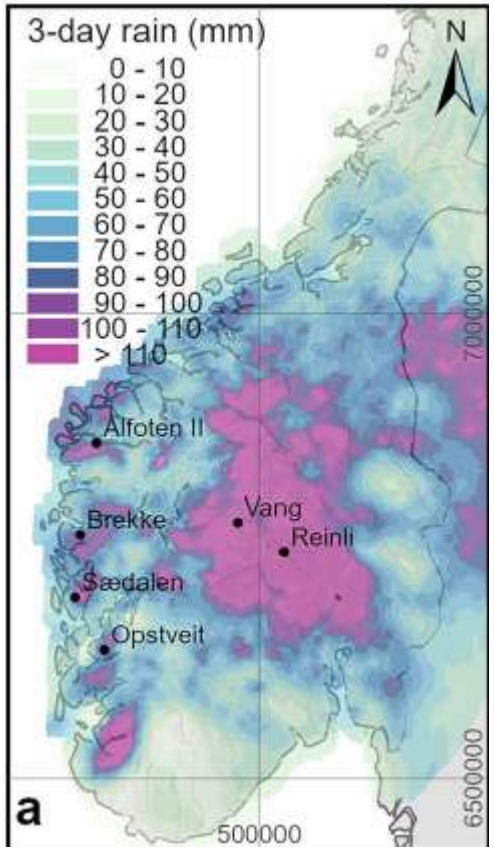
T4.1: The role of biodiversity in promoting forest health and resilience

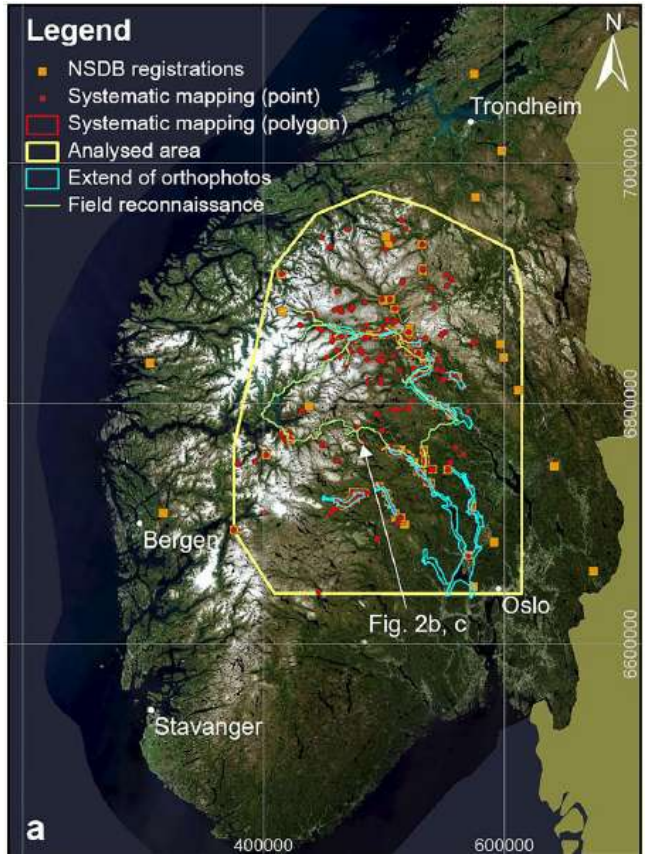
T4.1 will highlight and demonstrate the forest types most susceptible or tolerant towards specific damage agents, why the damage has happened; the underlying reasons that made the forest susceptible to the damage agent in question and how these relate to the structure and diversity of the forest, its surrounding environment, and the management history. The demonstrations will take place in FI, SE, NO, and EE, except for landslides which are in Norway only. T4.1 will conduct an extensive synthesis on and demonstrate in the field:

- How forest structure (species composition, age structure), management history and the surrounding landscape increase or decrease their susceptibility against specific damage agents.
- How components of biodiversity (dead wood, tree diversity) add to forest health and thereby their resilience.
- Which soil- and site types are most susceptible to the predicted, climate-induced damage risks (especially drought) and what tree species are most susceptible to the adverse effects if grown on a non-optimal site.
- How forest structure can mitigate the risk of severe geological hazards such as landslides.

Outputs: provide concrete examples of what the new risks caused by climate change can mean in practice and how we can adapt to them by diversifying our forests and avoiding bad practices.

….en motivasjonsstorm





648 skred i flere dager!

Rüther med flere, 2024, Jordskred taksering etter Storm Hans, DOI 10.1007/s10346-024-02222-y

Oppgave om jordskred

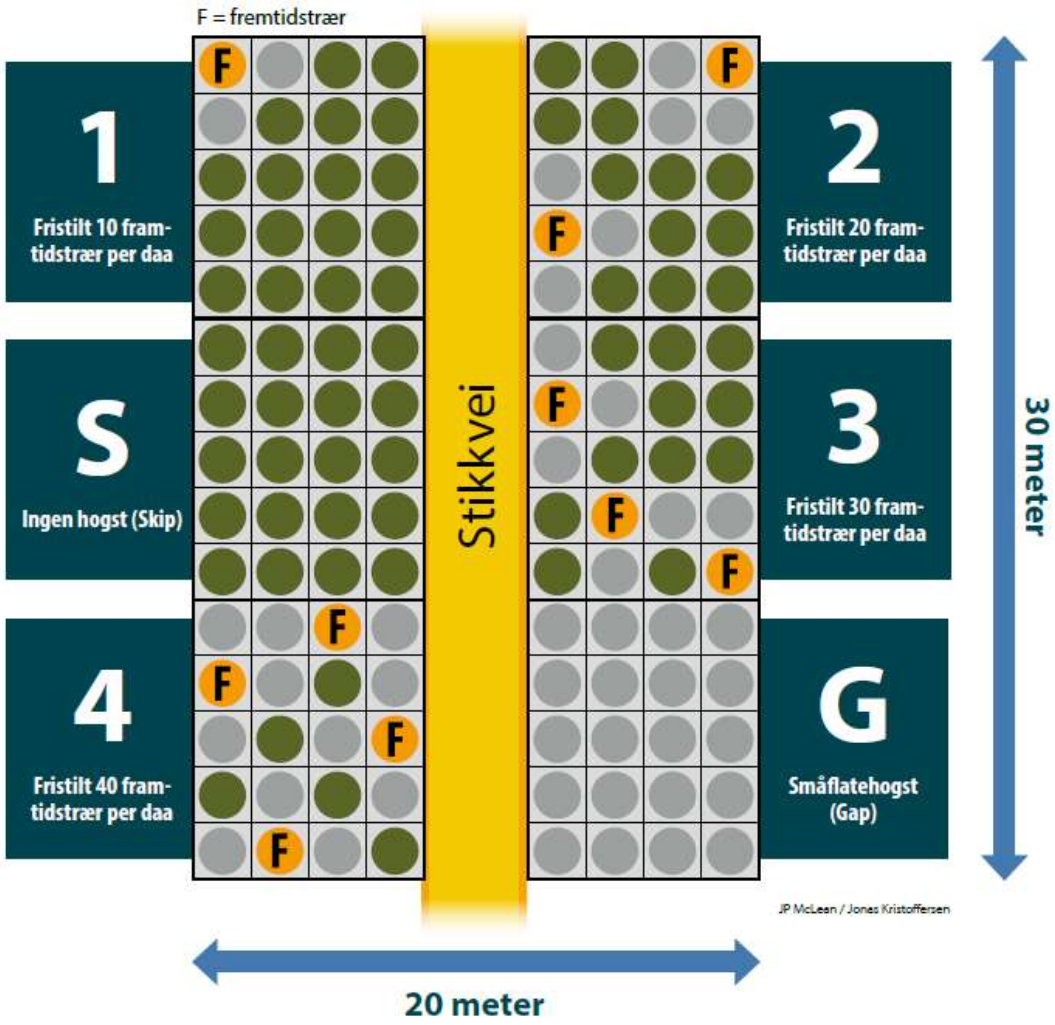
Flatehogst med tung maskiner øker risiko til jordskred i bratt terreng

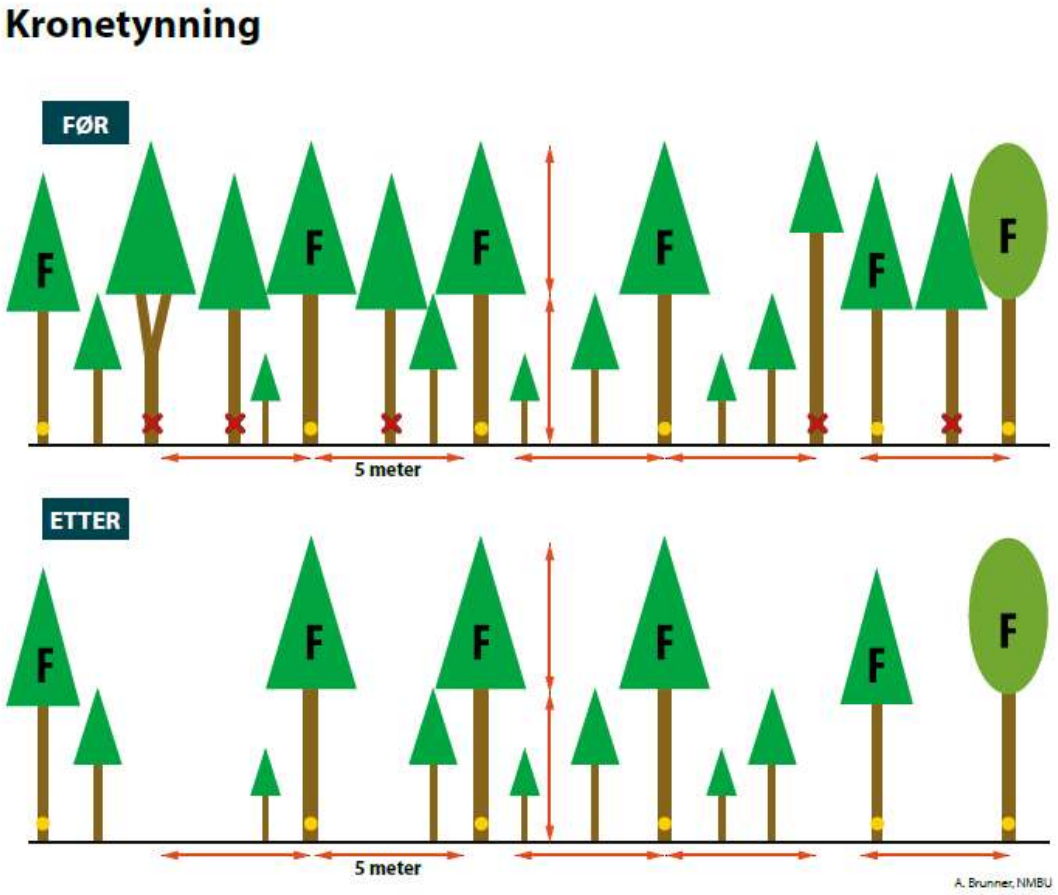
Lukkedehogst med taubane kan stille et stabil skog struktur med uavbrutt beskyttelse til skred

Omstilling

Omstilling til selektiv hogst
Tynning til variabel tetthet (VDT)

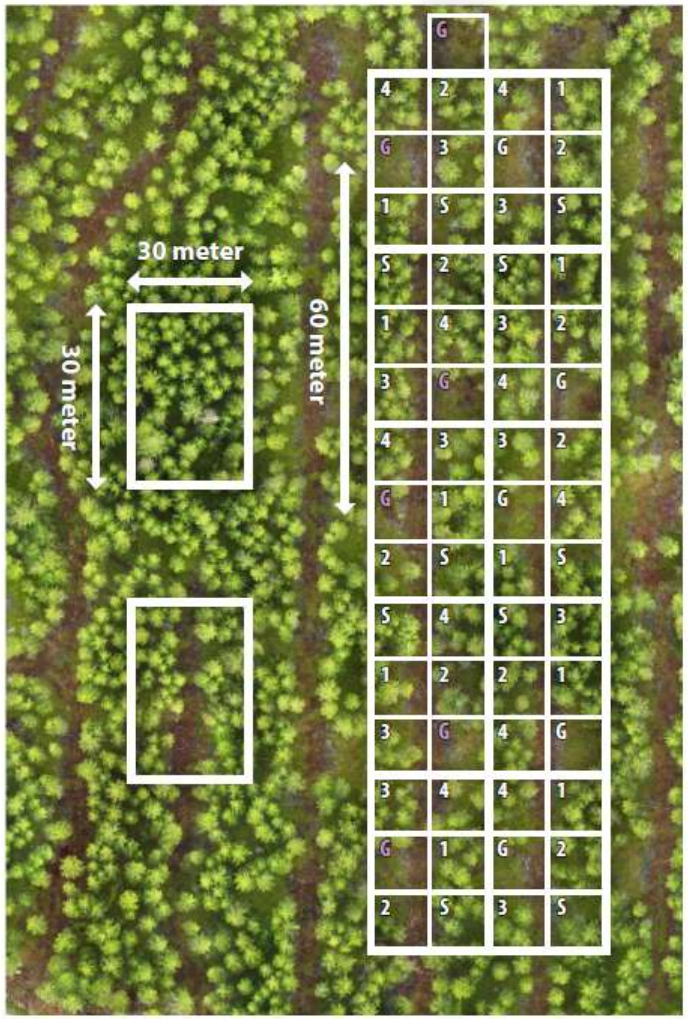
- Grantrær på granmark
- Inntil 13 meter gjennomsnittshøyde





Langsiktig feltforsøk i skogen
Omstilling til selektiv hogst med VDT

- Fire ulike steder
- Eksempel fra Hurdal



JP McLean

G	1	G	2	G	1
3	4	2	4	1	3
4	G	3	G	2	G
S	1	S	3	S	2
3	S	2	S	1	S
1	1	4	3	2	1
G	3	G	4	G	3
1	4	3	3	2	1
2	G	1	G	4	G
S	2	S	1	S	4
1	S	4	S	3	S
3	1	2	2	1	3
G	3	G	4	G	1
3	3	4	4	1	3
4	G	1	G	2	G
S	2	S	3	S	2
3	S	2	S	1	S

JP McLean

Del	Uttak m^3 daa	Uttak % stående
Stikkvei	5,2	24
Gaps	2,6	12
Tynning	2,8	13
Totalt uttak	10,6	49
Gjenværende	10,8	51

JP McLean

S = ingen hogst (Skip)
G = småflatehogst (Gap)
1 = fristilt 10 framtidstrær per daa
2 = fristilt 20 framtidstrær per daa
3 = fristilt 30 framtidstrær per daa
4 = fristilt 40 framtidstrær per daa

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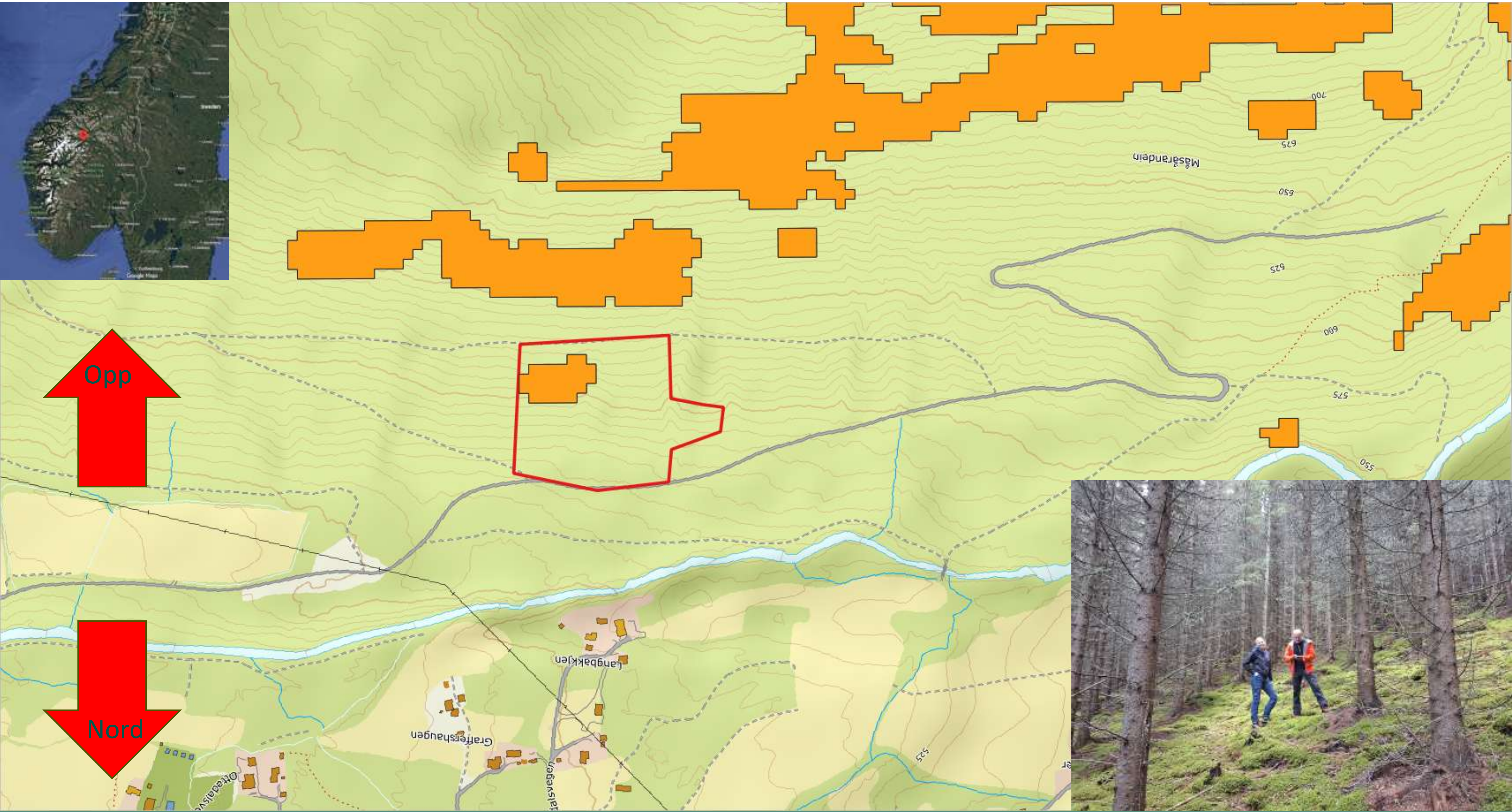

Opp
Nord

Skogkurs
Statsforvalteren i Innlandet
Kommuner i Gudbransdalen
NGI
NVE
Valdres Skog
Skog og Skred AS
Meyer Mannhof

WTF er Økologisk ingeniørkunst

Opp

40m

50m

VDT

VDT med underplantering

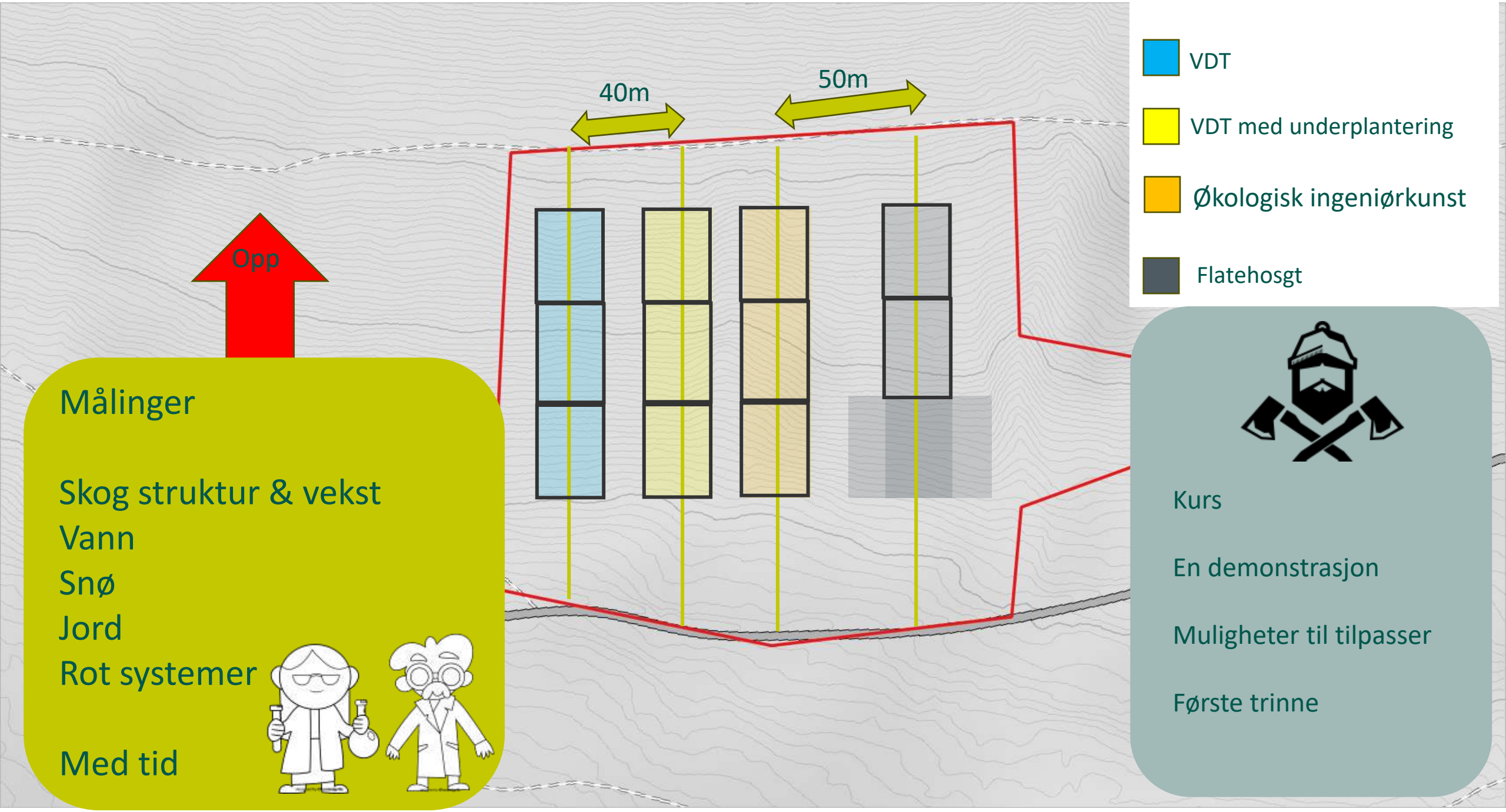
Økologisk ingeniørkunst

Flatehosgt

30m

20m

https://risprockfallprotection.com/en/solutions/single-point-anchor-stabilization-unit-kits/


40m
50m
Opp
VDT
VDT med underplantering
Økologisk ingeniørkunst
Flatehosgt
Målinger
Skog struktur & vekst
Vann
Snø
Jord
Rot systemer
Med tid
Kurs
En demonstrasjon
Muligheter til tilpasser
Første trinne

Status

Søkt penger i Innlandet og venter på svar…

Ønsker til å gjøre de sammen i Trøndelag…meld på!

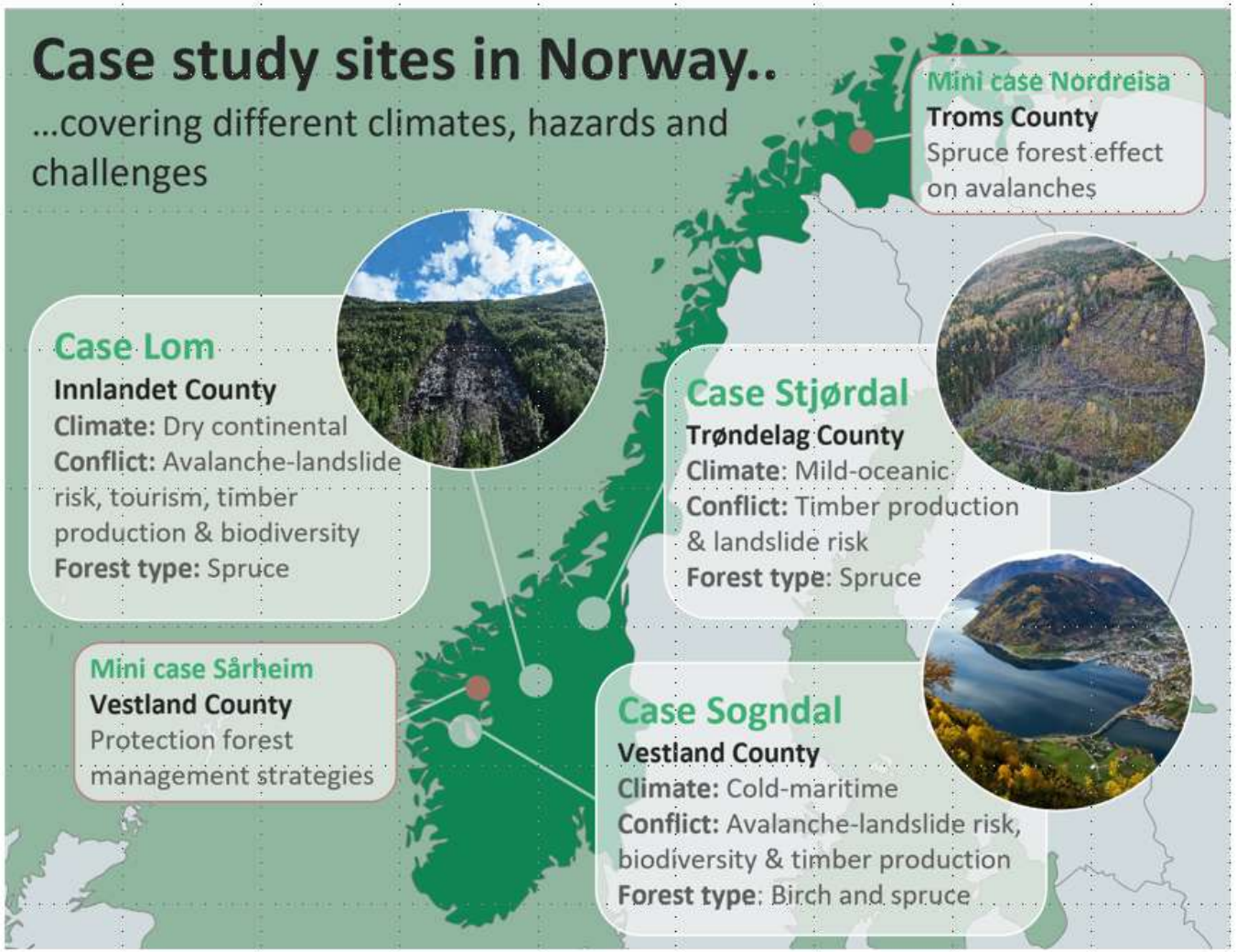


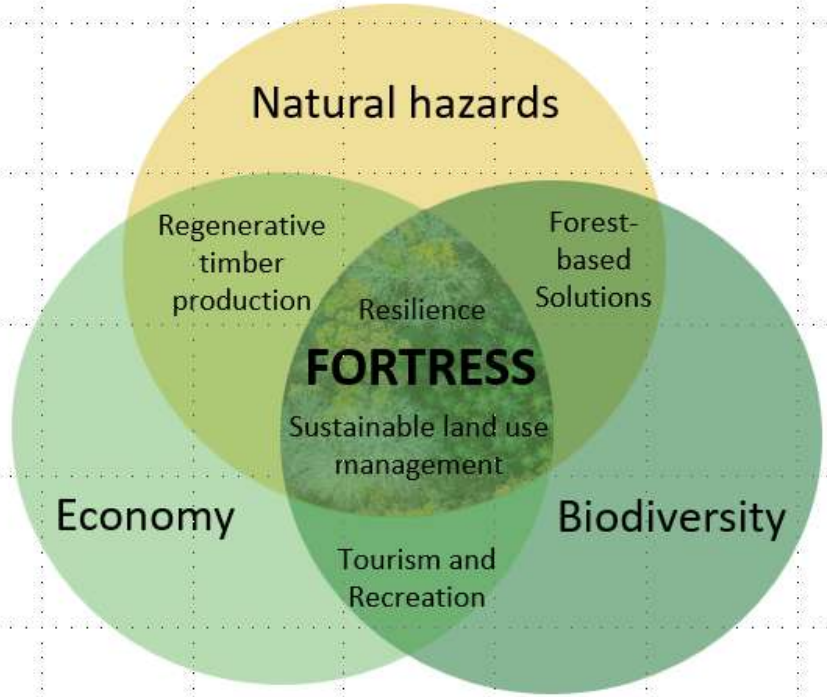

FORTRESS – FOResT land use management for REsilient and Sustainable Societies

2026-2030
Start : 1st April 2026
Kick-off in Sogndal June 2026

Case study sites in Norway..

...covering different climates, hazards and challenges





Steering committee: Heidi Hefre (NGI), Bjørn Håvard Evjen (NIBIO), Odd Are Jensen (NVE), Fredrik Vaadal (LD), Dirk Kohlmann (SFV), Carl Olav Holen (SFI), Yngve Holt (Glommen-Mjøsen Skog), Kjell Svennevik (AT Skog)

WP 6 Project management, dissemination, communication & exploitation
NGI - PI: Kjersti G. Gisnås, PA: Amy Oen, QA: Dieter Issler

WP1 Avalanches & silviculture
Dieter Issler, NGI

WP2 Forest & landslides
Vittoria Capobianco, NGI

WP3 Forest Ecosystem Services
John Paul McLean, NIBIO

WP4 Legislation & spatial planning
Mina Di Marino, NMBU

WP 5 Education & Capacity building
Denise Rüther HVL

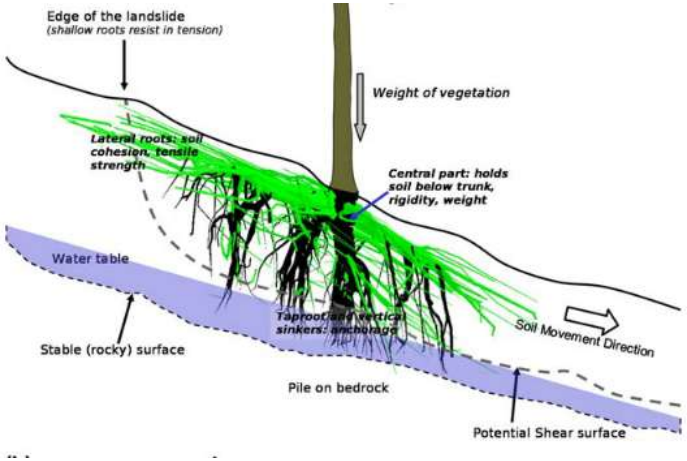
FORTRESS Advisory board: *Johan Gaume (ETHZ), Peter Bebi (SLF/WSL), Alexia Stokes (INRAE), Peter Lehmann (ETHZ)*

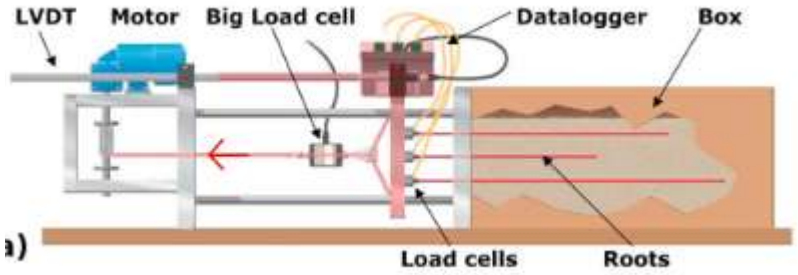
NGI · NIBIO · NMBU Norges miljø- og biovitenskapelige universitet · Høgskulen på Vestlandet · BFW

Jordskred modeller at gjelder til norsk forhold (gran skog)

WP2 Forest & landslides
Vittoria Capobianco, NGI

Utløsning Sannsynlighet = Terreng + Jord + Forankring + Vann





Reubens m fl. 2007, DOI 10.1007/s00468-007-0132-4

Schwarz m fl. 2011, doi:10.1029/2010JF001753,

NIBIO

Beregne ut verdi av økosystem tjenester, spesielt «sikring» verdi

Evidence for protection forest management advice and legislation

Kombinasjon av vern mot naturefare med vern til biomangfold

Forsker Prosjekter om sikring skog mot skred

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