



Nature-based solutions

UN Global Compact Norge: Stakeholder meeting on Circular Economy

26 august 2021

Bjørn Kalsnes, Vittoria Capobianco, NGI
Berit Time, Edvard Sivertsen, SINTEF

SFI – KLIMA2050

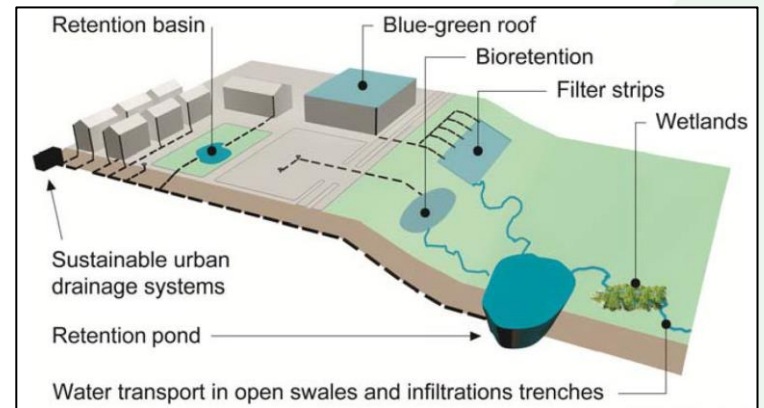


- 20 Partners from research, public sector, and industry.
- 8 year duration (2015-2023)
- Total budget NOK 221 mill. (24 mill. EURO)

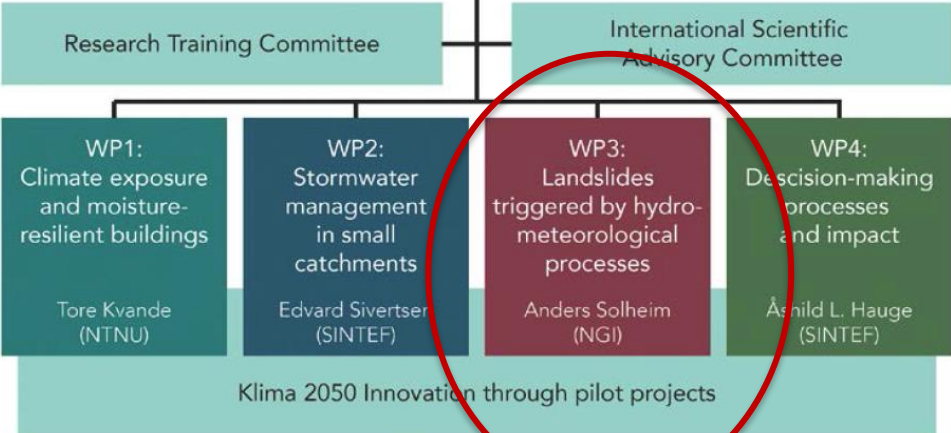
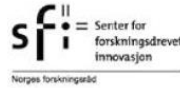


www.klima2050.no

Risk reduction through climate adaptation of buildings and infrastructure



SFI – KLIMA2050 - organization



Innovations for reduced societal risk lies in

- Regulations
- Municipal plans and building processes
- Robust technology
- Nature-based solutions
- Incentives and business models
- Services

NGI's contribution is focused within Work Package 3

Klima 2050 will develop principles, methods and solutions for reducing the risk posed by water-triggered landslides on populated areas and transportation infrastructure in a future climate regime

Nature-based solutions

- ❑ Solutions **inspired and supported by nature**, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience (EU, 2015)
- ❑ Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions
- ❑ Nature-based solutions **must therefore benefit biodiversity and support the delivery of a range of ecosystem services***



[*Nature-based solutions | European Commission \(europa.eu\)](https://europea.eu)

Benefits of using NBS

Physical consequences:

- Reduced probability for damage due to landslides and floods;
- Help in maintaining, even enhancing, the quality of ecosystems in the immediate vicinity of the measure through time;
- Increase recreation areas for local residents and thus increase their quality of life;

Societal and political consequences:

- Contribute to increased participation in local democracy;
- Improved municipalities or other public entities, ability to carry out major projects with great local interest and participation;
- Increase the societal awareness of sustainable solutions for a better future;
- Better communication between problem owner and user;

Economic consequences:

- Be economically advantageous, not least considering the future needs of maintenance;
- Stimulate innovative development;
- Contribute to participation by local business and local entrepreneurs

NBS i Norge

Statlige planretningslinjer for klima-og energiplanlegging og klimatilpasning:
§ 4.3 Krav til plansprosess og beslutningsgrunnlag

- Bevaring, restaurering eller etablering av naturbaserte løsninger (slik som eksisterende våtmarker og naturlige bekker eller nye grønne tak og vegger, kunstige bekker og basseng mv.) **bør vurderes**. Dersom andre løsninger velges, skal det begrunnes **hvorfor naturbaserte løsninger er valgt bort**.

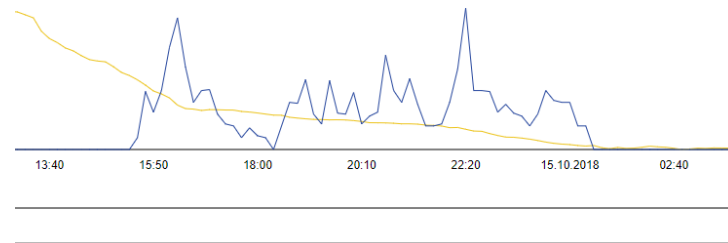


Blågrønne og blågrå tak

Høvringen Trondheim (WP1)

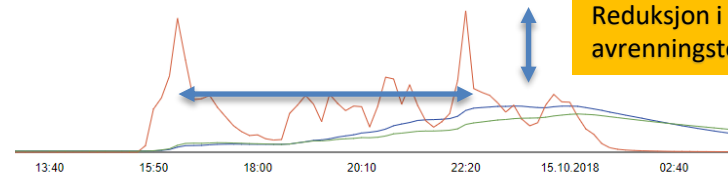
Uttesting av ulike typer naturbaserte tak
-ulike oppbygginger
-fordrøying
-nordisk klima

Temperature and precipitation



Forsinkelse i avrenningstopp

Reduksjon i avrenningstopp



Rød = svart tak (referanse)

Grønn = blågrønt tak

Blå = blågrå tak



Partnere: Trondheim kommune, Leca, Skjævelandgruppen, Isola, NTNU, SINTEF

Pilotprosjekt

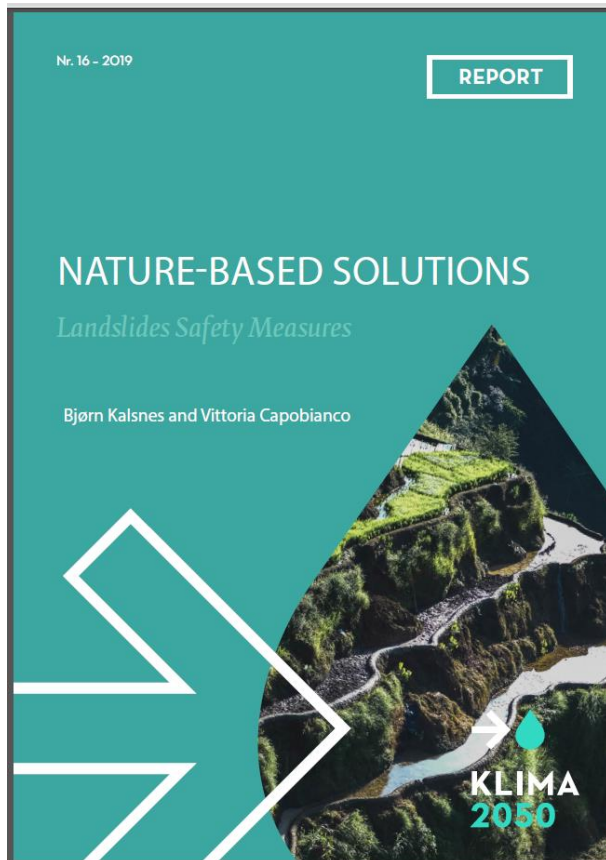


Pilotprosjekt – utprøving av naturbasert overvannsløsning på ny RV 3 ved Elverum
Uttesting og dokumentasjon av grøfteløsning gjennom målinger i grunnen (WP2)

Partnere: Skanska, Statens Vegvesen, Multiconsult, SINTEF, NTNU

WP3: Klima 2050 report No. 16

Review of soil bioengineering techniques for erosion control and landslide mitigation along slopes and riverbanks.



Soil Bioengineering practice:
The use of living plant materials to build structures that provide slope support and erosion protection.

Soil Bioengineering practice can be considered as the pioneer of NBS for landslide protection since it provides environmental-friendly and cost-effective solutions in accordance with the principles of NBS actions "inspired by, supported by or copied from nature".

Article in Vann (fall 2020)

Nytt verktøy kan bidra til at flere velger naturbaserte løsninger for å redusere skred og erosjonsfare langs elver og bekker



Av Vittoria Capobianco, Christina Ekeheien og Bjørn Kalsnes

Vittoria Capobianco har PhD i "["landslide risk mitigation measures"](#)" fra Universitetet i Salerno (Italia) og er geotekniker ved NGI

Christina Ekeheien har en mastergrad i geovitenskap fra UIO og er geolog ved NGI

Bjørn Kalsnes er utdannet sivilingeniør fra NTNU og er seniorspesialist ved NGI

Sammendrag

Norges Geotekniske Institutt (NGI) har i innovasjonssenteret Klima 2050 utviklet et nettbasert verktøy som kan hjelpe blant annet kommuner i å velge riktige tiltak for å redusere skredfare i skredutsatte områder. Verktøyet har i alt 11 kategorier med sikringstiltak, inkludert to kategorier med naturbaserte løsninger (NBS). NBS er løsninger som ikke bare bidrar til skred- og erosjonssikring, men som også gir merverdi i form av miljømessige, sosiale og økonomiske fordeler.

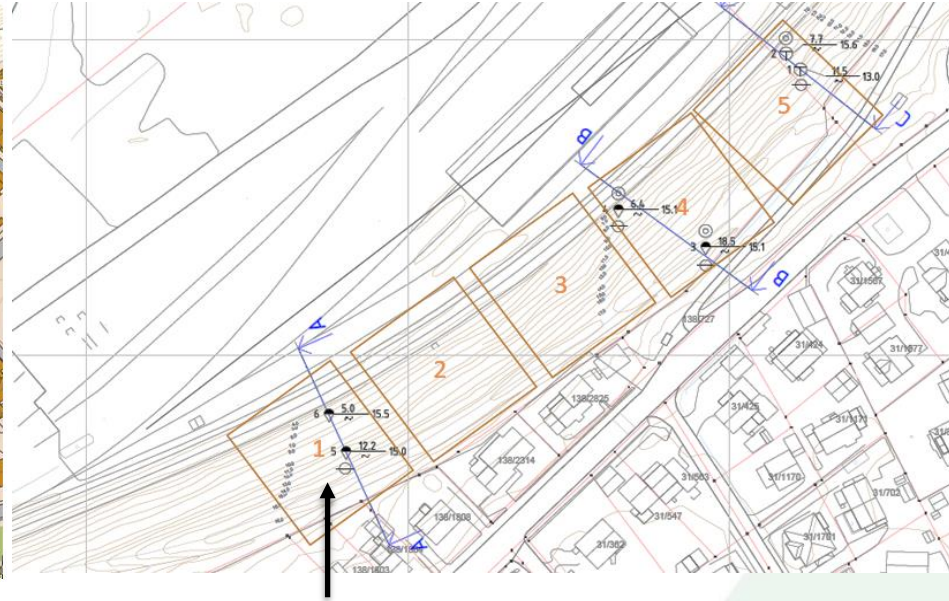
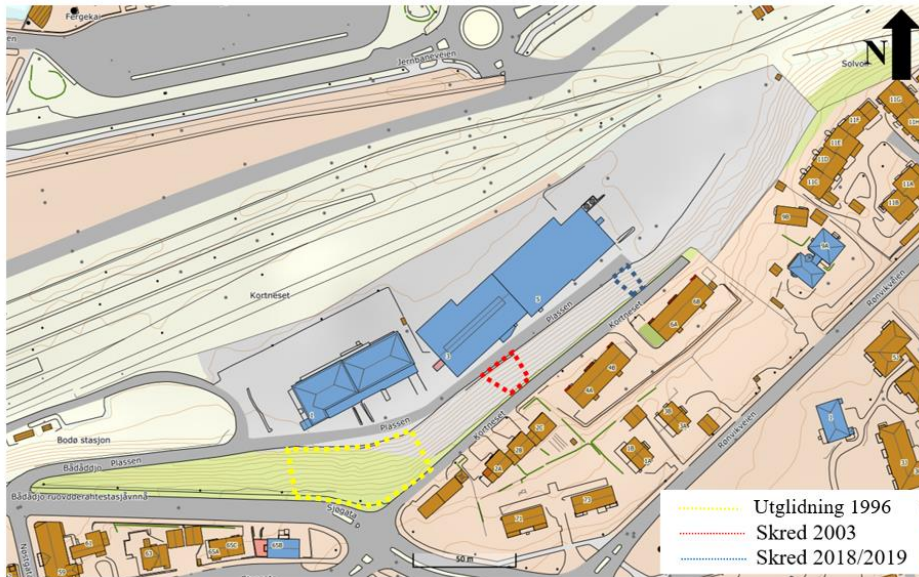
Klimaendringer vil føre til økning av naturfarer som skyldes nedbør

Det er forventet en økning av ekstreme nedbørhendelser fra mot år 2100 (Hanssen-Bauer et al., 2015). Det betyr at vi også må forvente at uønskede hendelser utløst av vann, som erosjon, flom og skred, forekommer hyppigere framover. Områder langs elver og bekker er spesielt utsatt for klimaendringer, fordi både kortvarig og langvarig nedbør kan føre til flommer, erosjon og utglidninger av elvebredden.

Med Norges varierte topografi, fra høye fjell til dype dalsøkk, finnes det mange vassdrag som reagerer raskt ved intens nedbør. I bunnen av dalene er jorden fruktbar og næringsrik, og mange landbruksområder finnes nettopp



NBS along railways – pilot case Bodø



Felt 1: Naturbasert løsninger (NGI)

Felt 2: Multiconsult – conventional draining

Felt 3: ingen tiltak

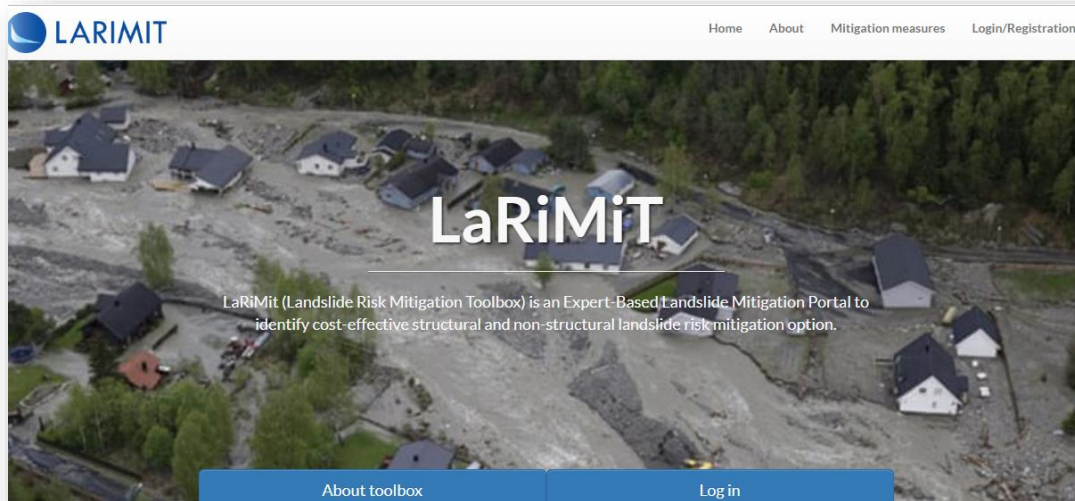
Felt 4: Storm Aqua (eventuelt)

Felt 5: Leca (eventuelt i kombinasjon med Storm Aqua)



Practical tools to support decision makers in choosing the best landslide mitigation alternative

Need: Local authorities and organizations may not possess the necessary expertise to address landslide hazards. A tool is needed to help guide decision makers through this process



Beneficiary: Organizations with responsibility for health and safety of society and infrastructure

Application: Web-based expert tool accessible to all who need it

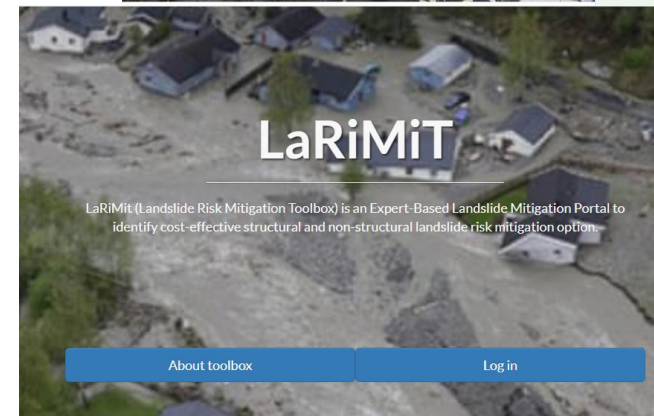
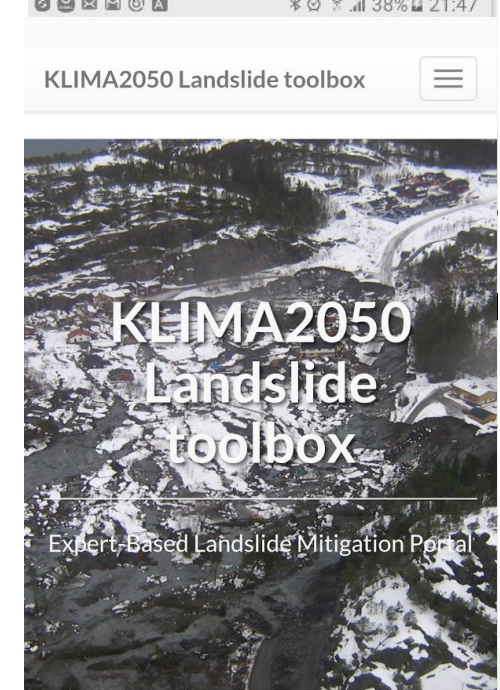


WP3.2. Mitigation measures

<https://www.larimit.com/>

Web portal LaRiMiT

- Allows extensive database of alternatives for mitigation measures
- Provides an expert-assisted tool for the case- and site-specific ranking and best-practice selection of landslide risk mitigation measures.
- Allows the synergy between portal administrators, users and landslide risk experts in pursuing the optimization of risk reduction measures through the merging of user-input case- and site-specific information with expert-input knowledge



NBS in LaRiMiT

Category

Measure

1 NBS for erosion control – living approach

Measures involving the use of natural living materials (stakes, brushes, plants) to protect from surface erosion

Direct planting



2 NBS for erosion control - Combined living-not living approach

Measures involving the combined use of natural living materials and synthetic/inert material to protect from surface erosion

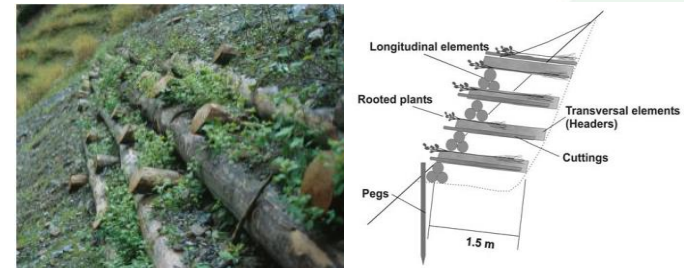
Geotextiles and vegetation



8 Retaining structure to improve slope stability

Measures involving the use of materials obtained from plants such as trunks, stems etc.

Live crib walls



Summary and Conclusion

- NBS is in use in urban and rural development
- Lot of research, especially in European scale
- NBS in various Klima 2050 pilots
- LaRiMiT, a web based tool to select appropriate landslide mitigation measures, including NBS



Thank you for your attention!

bgk@ngi.no, vic@ngi.no



www.larimit.com



 KLIMA2050