European Conference of Defence and the Environment

ECDE 2024

KRISTIN THORSRUD TEIEN
CICERO

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Nature-based solutions: Important for climate adaptation, biodiversity conservation, society, and security

ECDE 2024: Defence, climate and environment – coinciding, not conflicting possibilities, 13.06.2024.

Kristin Thorsrud Teien, Department Director, CICERO

CICERO Interdiciplinary climate research

- One of the environmental institutes in Norway, established in 1990
- Major scientific contributions to our understanding of the climate system
- Around 100 employees
- Five departments, of which three research departments:
  1. System and Mitigation
  2. Society and Policy
  3. Atmosphere and Climate impacts

~100 employees

7 research groups

>100 academic publications in 2022

>100 ongoing research projects

~ 90 user partner

NOK 120 M turnover in 2022

Extreme weather in Europe in 2023: A wake-up call?

- The extreme weather event “Hans” in Southern Norway, August 2023
- The flood in Greece, September 2023

Foto: AFP

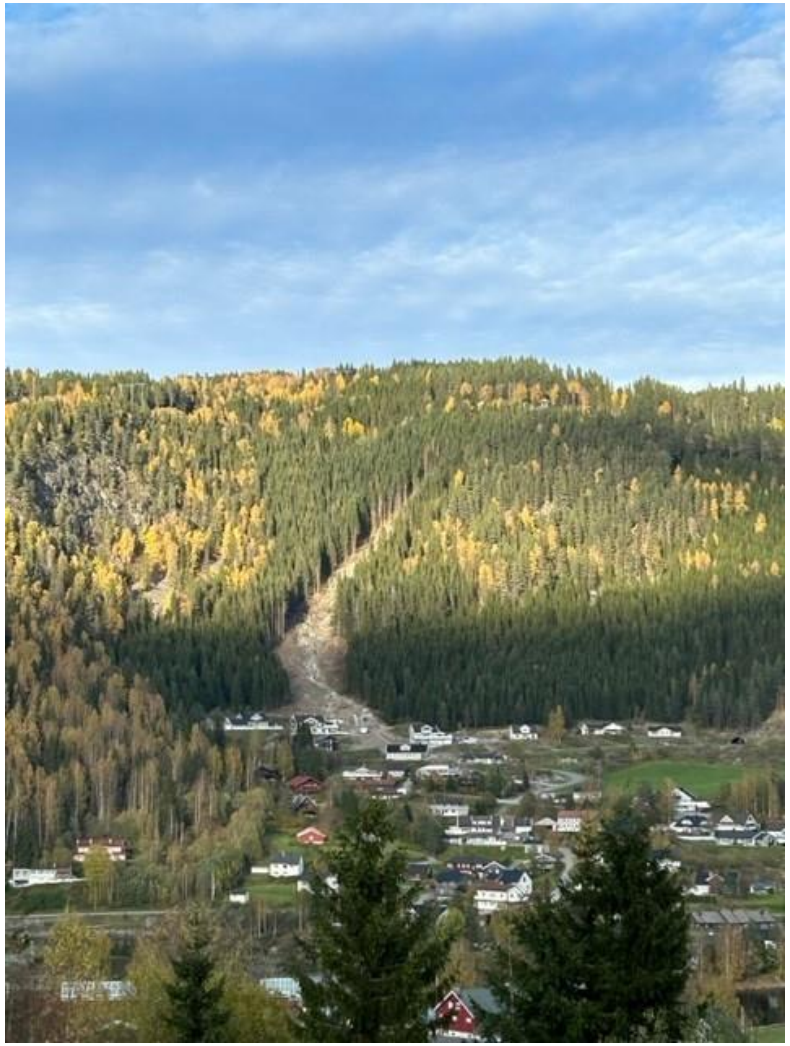


Foto: Kristin Teien

The costs of extreme weather

- Last 10 years: The insurance companies in Norway have compensated NOK 30.3 billion for damage to buildings and contents after weather events
- The largest compensation comes after extreme precipitation over towns and cities
- Asphalt on streets, roads, and parking lots prevents natural drainage of the water, and the water finds it´s way into buildings
- It is important to think long-term in long-term land use planning land use and when planning for new buildings and settlements
- Further information: [ekstremvarrapporten-2023.pdf (if.no)]

FLOM: Deler av Dokka camping er helt oversvømt av vann etter at Dokkaelva har gått over sine bredder. Foto: Stian Lysberg Solum / NTB

European climate risk assessment (1)

- Extreme weather events compromise food and water security, energy security and financial stability, and the health of the general population and of outdoor workers; in turn, this affects social cohesion and stability.
- In tandem, climate change is impacting terrestrial, freshwater and marine ecosystems.

- Climate change can exacerbate existing risks and crisis, and climate risk can cascade from one system or region to another

- This can lead to system-wide challenges affecting whole societies, with vulnerable social groups particularly affected.

- **Several climate risks have already reached critical levels, and most climate risks identified could reach critical or catastrophic levels by the end of this century**.

European climate risk assessment (2)

- Hundreds of thousands of people would die from heatwaves, and economic losses from coastal floods alone could exceed EUR 1 trillion per year.

- Climate risks to ecosystems, people and the economy depend on non-climatic risk drivers as much as on the climate-related hazards themselves.

- The extent to which we can avoid damages will largely depend on how quickly we can reduce global greenhouse gas emissions, and how fast and effectively we can prepare our societies and **adapt to the unavoidable impacts of climate change**.

- **Urgent and coordinated action is needed at all governance levels**

[European Climate Risk Assessment — European Environment Agency (europa.eu)](#)

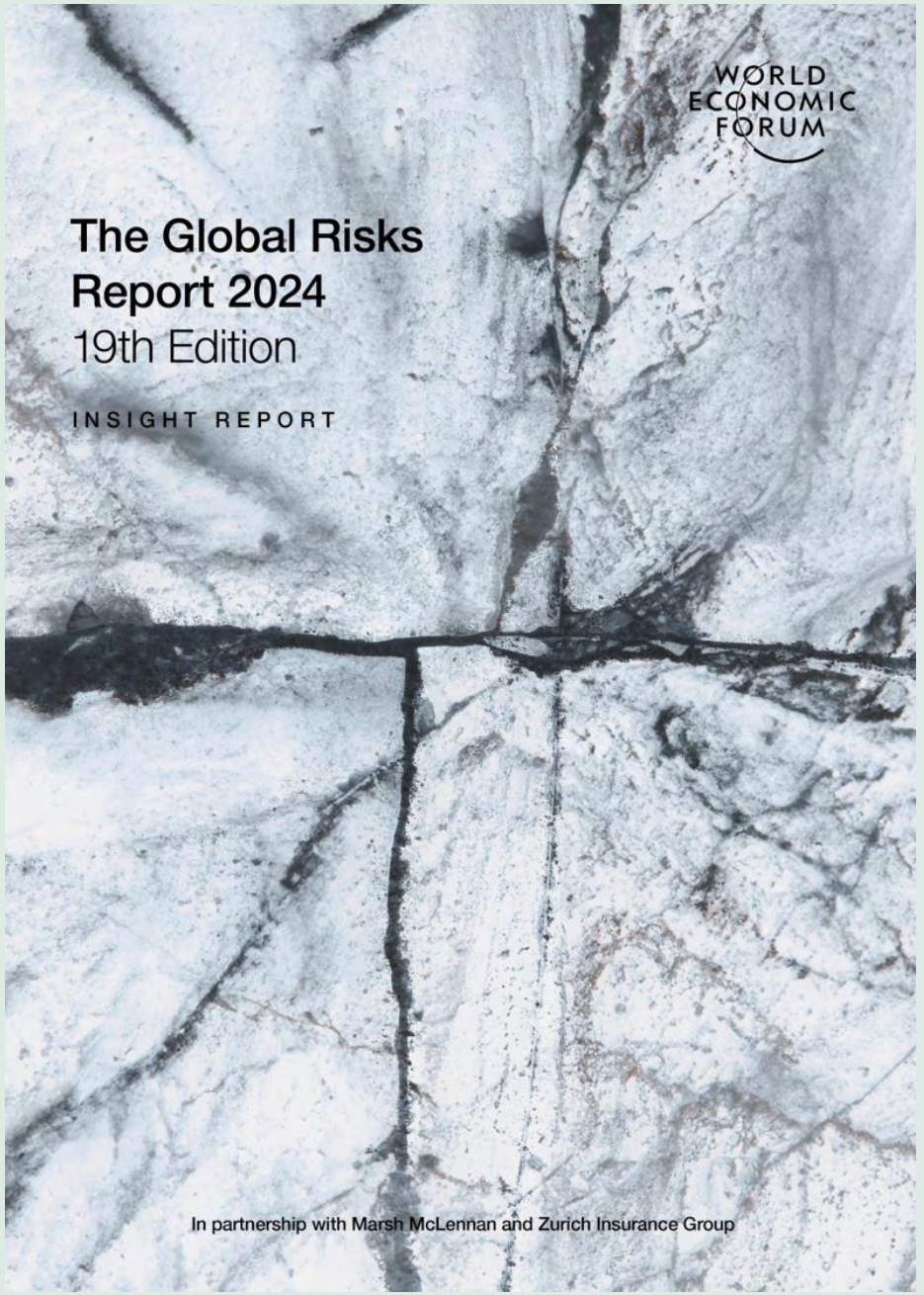
Global risks for the next 2 and 10 years

- Climate and environmental risks are at the core of global risk perceptions over the next 10 years.
- These risks are the ones we are least prepared for.
- Interactions between loss of nature, pollution, consumption of natural resources, climate change and socio-economic drivers will **"constitute a dangerous mixture".**
- [WEF_The_Global_Risks_Report_2024.pdf (weforum.org)]

FIGURE C **Global risks ranked by severity over the short and long term**

"Please estimate the likely impact (severity) of the following risks over a 2-year and 10-year period."

Source
World Economic Forum Global Risks Perception Survey 2023-2024.



We need to introduce solutions for adaptation

- MYRIAD-EU is set to change the way disaster risks are managed. Through its systemic and forward-looking approach, the project will offer new ways to assess trade-offs and synergies between economic sectors, hazards and their scales.

- Develop **tools and solutions** to reduce and manage risks in their regions more effectively: Mitigation, adaptation, and disaster risk response

- **Coordinated solutions** between sectors (for examples) to avoid for example land use conflicts, competition for water (dealing with shortages and surpluses of water) and so forth..

- Several benefits: Economy, health and well-being, biodiversity, social justice etc.

- More information:
  - MYRIAD-EU About MYRIAD-EU - MYRIAD-EU (myriadproject.eu)
  - Anne Sophie Daloz (cicero.oslo.no)

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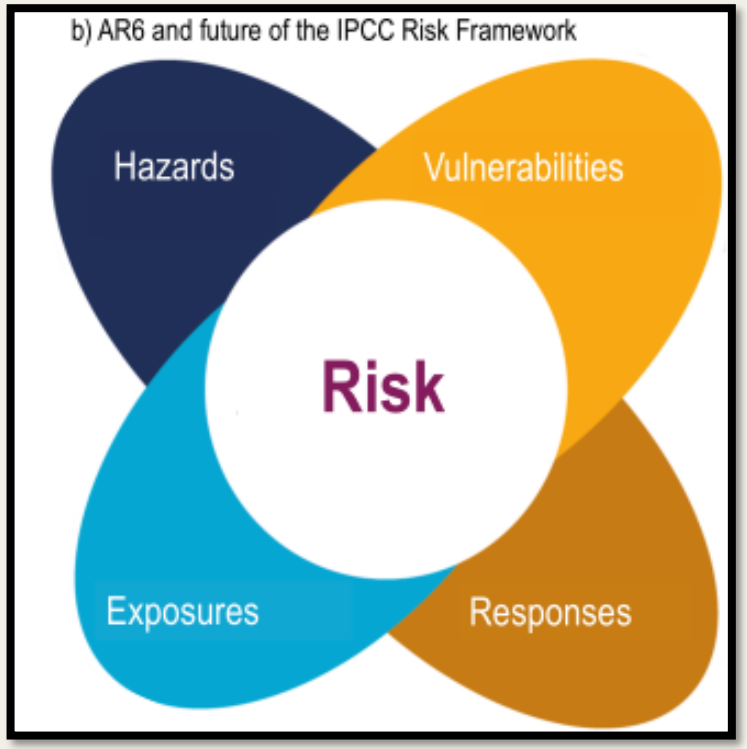
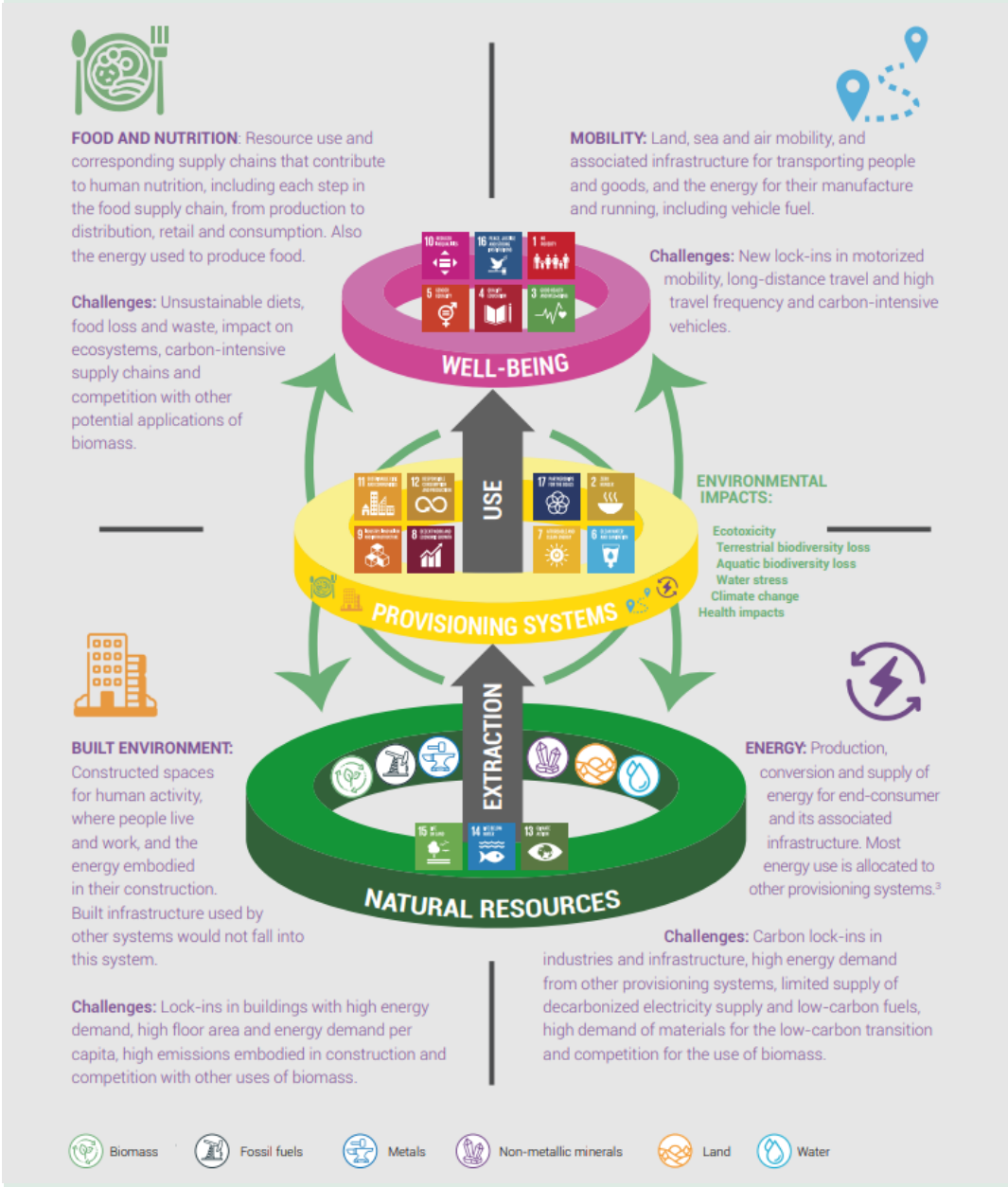
Climate risk



Source: IPCC-SPM.3

Global Resources Outlook 2024

- The International Resource Panel has developed Global Resources Outlook 2024 with a Summary for policy-makers:
  - [Global Resources Outlook 2024 | UNEP - UN Environment Programme]
- Combined, the resource-intensive provisioning systems of the built environment, mobility, food and energy, account for:
  - about 90 per cent of global material demand,
  - 70 per cent of climate impacts and
  - more than 80 per cent of biodiversity loss and water stress



Global Resources Outlook 2024:
The pressure on natural resources expected to increase

8 NYHET MANDAG 4. MARS 2024

FN: Bruken av verdens naturressurser kan øke med 60 prosent fram mot 2060

KLIMA: Utvinning og bruk av jordas ressurser kan øke med opp til 60 prosent innen 2060 og truer både klimamål og økonomisk velstand, advarer FN.

NTB

Verdensorganisasjonen tar til orde for drastiske endringer på områder som energi, matproduksjon og -forbruk, transport og boligbygging.

FNs ressurspanel sier i 2024-utgaven av rapporten om bruken av verdens naturressurser at enorm utbygging av infrastruktur, økt etterspørsel etter energi og økt forbrukerkonsum i de siste 50 årene, særlig i velstående land, har tredoblet forbruket av naturressurser.

– Og sulten etter mer naturressurser, alt fra mat til fossilt brennstoff, øker med et gjennomsnitt på over 2,3 prosent i året, heter det i rapporten som ble lagt fram i Nairobi fredag.

I OMLØP

WWF Verdens naturfond sier i en kommentar at den norske økonomien må innrettes slik at den opererer innenfor planetens tåleevne.

– Norge bør innføre et mål om reduksjon av materialforbruket. Det betyr at det i større grad må rettes inn mot å forvalte naturressurser som allerede er i omløp, framfor å fokusere på avfallshåndtering, sier WWF.

FNs ressurspanel sier at det er befolkningen i de velstående landene som i all hovedsak driver opp forbruket. De forbruker seks ganger mer naturressurser enn innbyggerne i fattige land og er ansvarlige for ti ganger større klimaeffekter enn dem som bor i lavinntektsland.

– Vi trenger sterkere og mer inngripende virkemidler som skatteordninger og statlig støtte som bidrar til at det blir billigere å velge sirkulært fremfor å ta ut stadig flere unørte ressurser, sier generalsekretær i WWF Verdens naturfond, Karoline Andaur.

ALARMERENDE

Klima- og miljøminister Andreas Bjelland Eriksen sier det er alarmerende at verdens bruk av ressurser øker langt raskere enn hva kloden tåler.

– Alle verdens land må ta ansvar for et mer bærekraftig forbruk. Regjeringen har en plan for å redusere bruken av fossil energi, vi jobber med flere tiltak for mer bærekraftig bruk av natur, og vi legger snart fram en handlingsplan for sirkulær økonomi, sier Bjelland Eriksen.

Hovedforfatteren av rapporten, Hans Bruyninckx, advarer om at dagens utviklingsbane vil føre til langt høyere temperaturøkning enn det som er målsettingen i Paris-avtalen fra 2015.

Her ble landene enige om å holde økningen under 2 prosent, fortrinnsvis under 1,5 prosent.

– Vi står overfor økende bruk av naturressurser og et avtrykk på jordas grunnleggende systemer som ikke er bærekraftig, sier Bruyninckx til AFP.

HELT NØDVENDIGE

Men han erkjenner samtidig at bruk av naturressurser er nødvendig for å snu utviklingen: både for å øke velstanden i fattige land og skaffe til veie mineraler og metaller som trenges i overgangen fra fossilt brennstoff til andre energikilder.

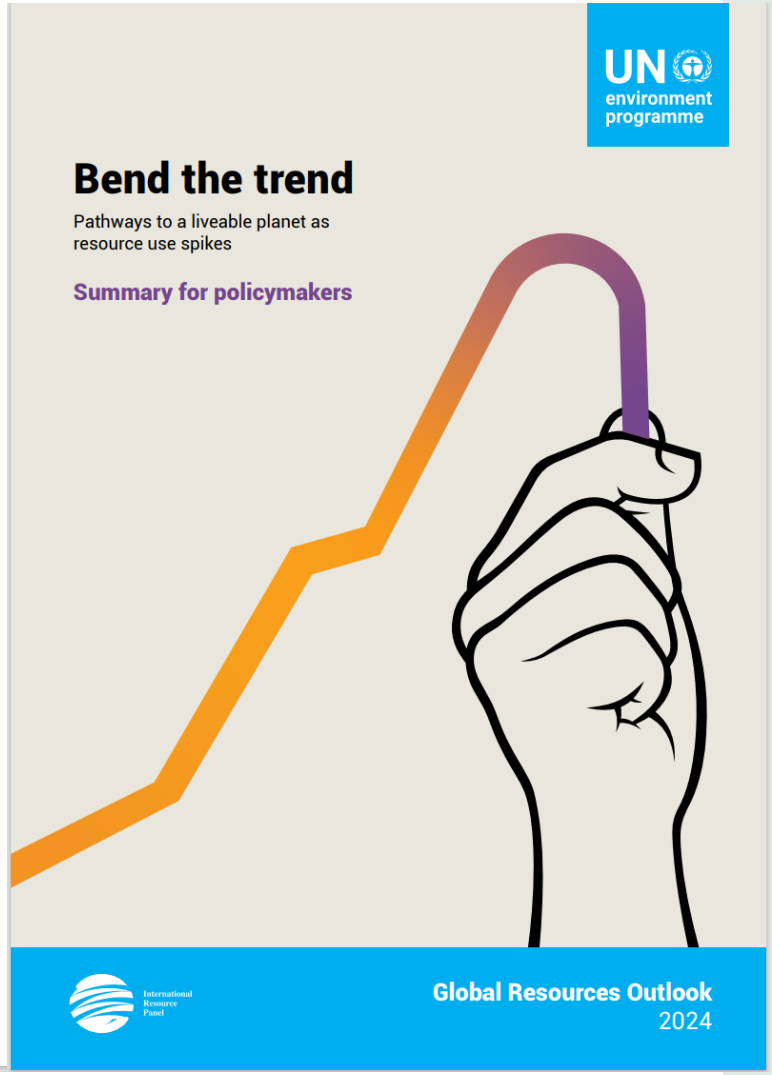
Uten drastiske grep vil utnyttelsen av jordas ressurser bare fortsette å øke. Datamodeller viser en økning på 60 prosent fra 2020 til 2060, fra 100 milliarder tonn til 160 milliarder.

– Den eneste valget vi har, er å stabilisere og balansere menneskelig virksomhet med naturen rundt oss, heter det i rapporten.

Svake, fragmenterte eller halvhjertede tiltak vil ikke virke. Det som trengs, er vidtrekkende og genuine systemendringer på energiområdet, i matproduksjonen, innenfor infrastrukturen og i byggesektoren i et omfang og med en hastighet som verden ikke tidligere har sett, heter det.

MÅL: Overforbruket av naturressurser truer klimamålene, advarer FNs ressurspanel. Bildet viser ekstremregn i Singapore. Foto: David Goldman / AP / NTB

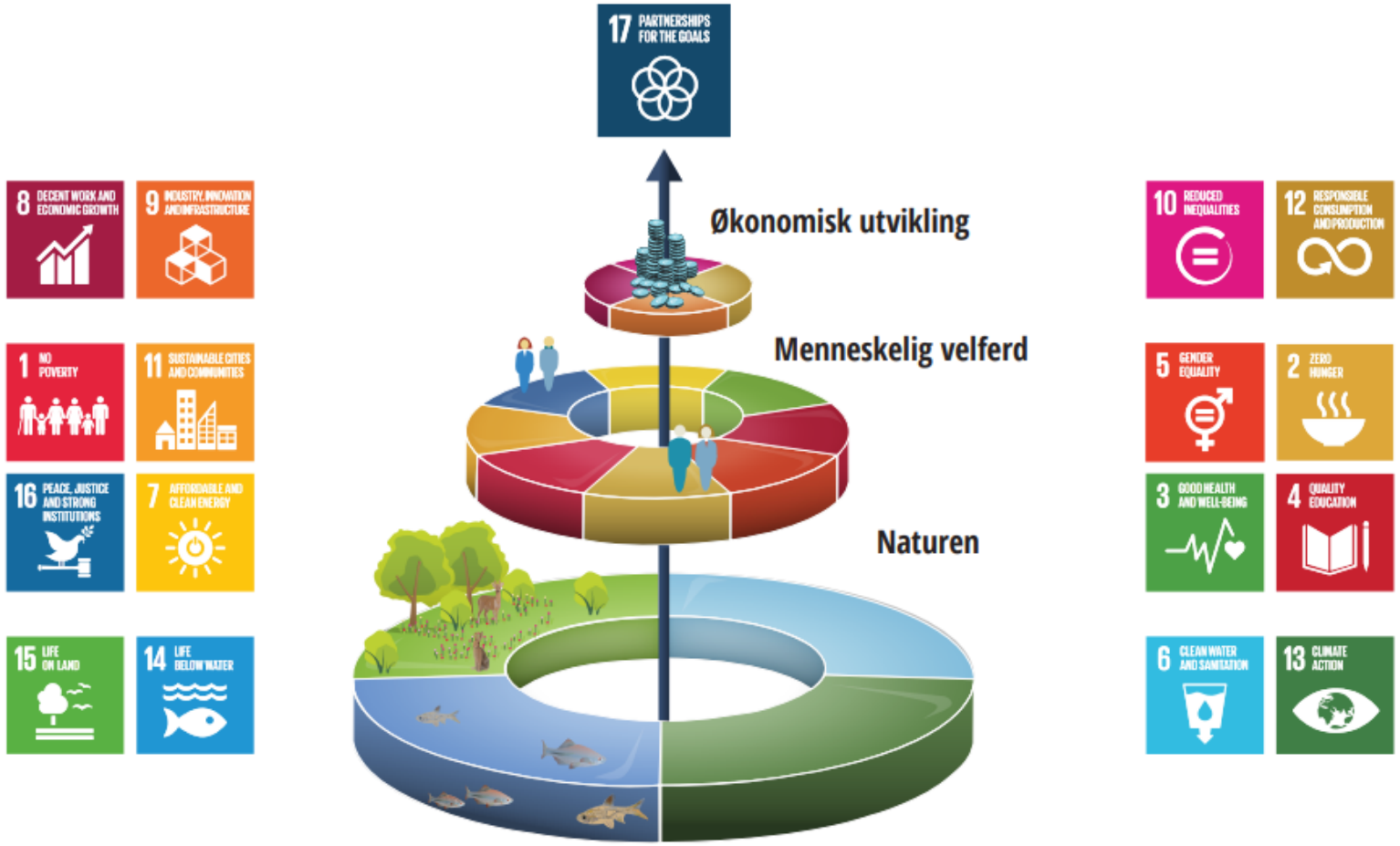
LIV I HAVET: En ung hval er funnet død utenfor kysten av Georgia i USA. Endringer i klimaet kan få alvorlige følger for livsmønsteret til utryddelsestruede arter. Foto: Georgia Department of Natural Resources via AP / NTB



- There is a need for urgent global transformation towards the sustainable use of resources.

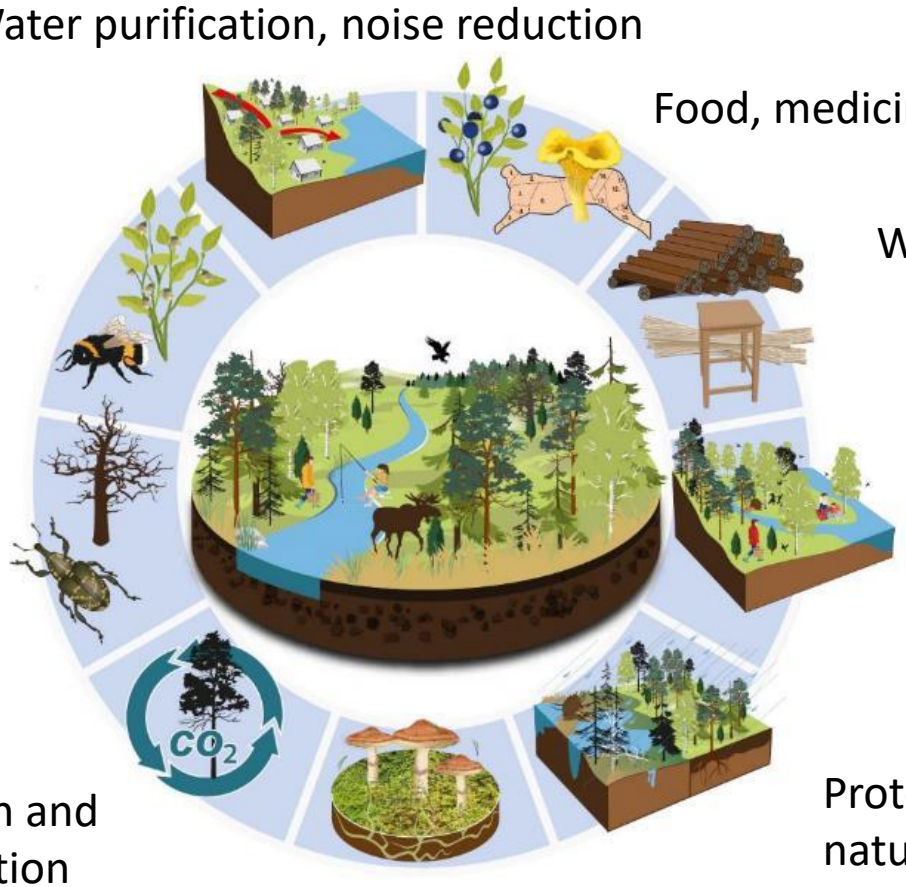
The messages from this report could not be clearer: It is no longer whether a transformation towards global sustainable resource consumption and production is necessary, but how to urgently make it happen.

Climate, nature, and environmental goals are fundamental for reaching other Sustainable Development Goals



Figur 1: *Figuren er en illustrasjon hvor FNs 17 bærekraftsmål kan settes i sammenheng, og viser hvordan økonomisk utvikling og menneskelig velferd avhenger av en sunn og bærekraftig natur (biosfære) i bunn. (Credit: Azote Images for Stockholm Resilience Centre)*

Robust ecosystems produce important ecosystem services



Kilde: Naturvårdsverket, Sverige

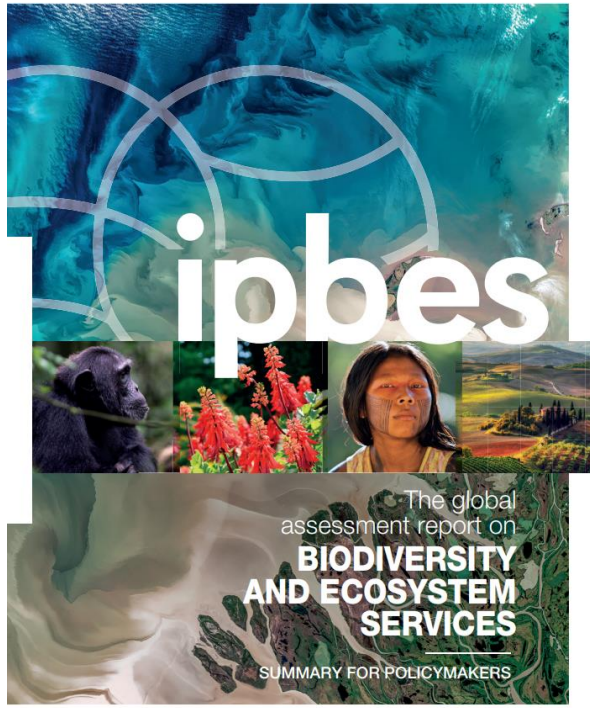
Land-use, land-use change, nature degradation and fragmentation: Impacts for biodiversity and climate

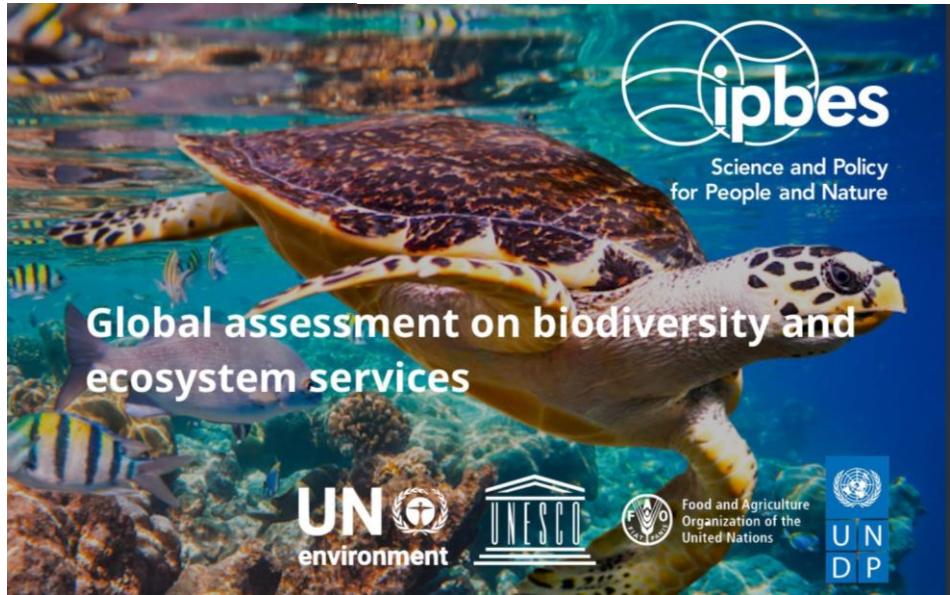
- Land degradation and land use change cause 25 % of global greenhouse gas emissions
- Nature will be more vulnerable to climate change
- Nature is important for climate change adaptation
- Robust ecosystems are necessary for our survival on earth

IPBES´s global assessment report from 2019

- 75% of the Earth's land area is significantly altered
- 1 million species threatened with extinction
- The extraction of natural resources and production of that have tripled in the last 50 years. Large parts of resource extraction are not sustainable
- 3.3 billion people suffer from destroyed nature
- Nature destruction costs 10% of the world's economy

- Summary for policymakers of the global assessment report on biodiversity and ecosystem services (zenodo.org)





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Why nature conservation is important for climate

- Natural ecosystems take up large amounts of carbon. Cutting emissions is not enough.
- Ecosystems in good ecological condition are more resilient to climate change and thus significant for adaptation.
- Nature conservation and healthy ecosystems are a good investment in climate mitigation and adaptation.
- Between 30 and 50 per cent of the world's land, lakes and oceans must be effectively protected.
- Weakened and degraded nature need to be restored.
- Nature conservation and climate measures must be planned and implemented hand in hand.
- Sustainable land planning and nature-based solutions are important climate adaptation measures. Advantages:
    - biodiversity, carbon sequestration, water regulation and many other social goods and services.

- AR6 Synthesis Report: Climate Change 2023 — IPCC

Foto: Kristin Teien

Global Biodiversity Agreement adopted in 2022

https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf

UN environment programme

CBD

Convention on Biological Diversity

Distr.
LIMITED

CBD/COP/15/L.25
18 December 2022

ORIGINAL: ENGLISH

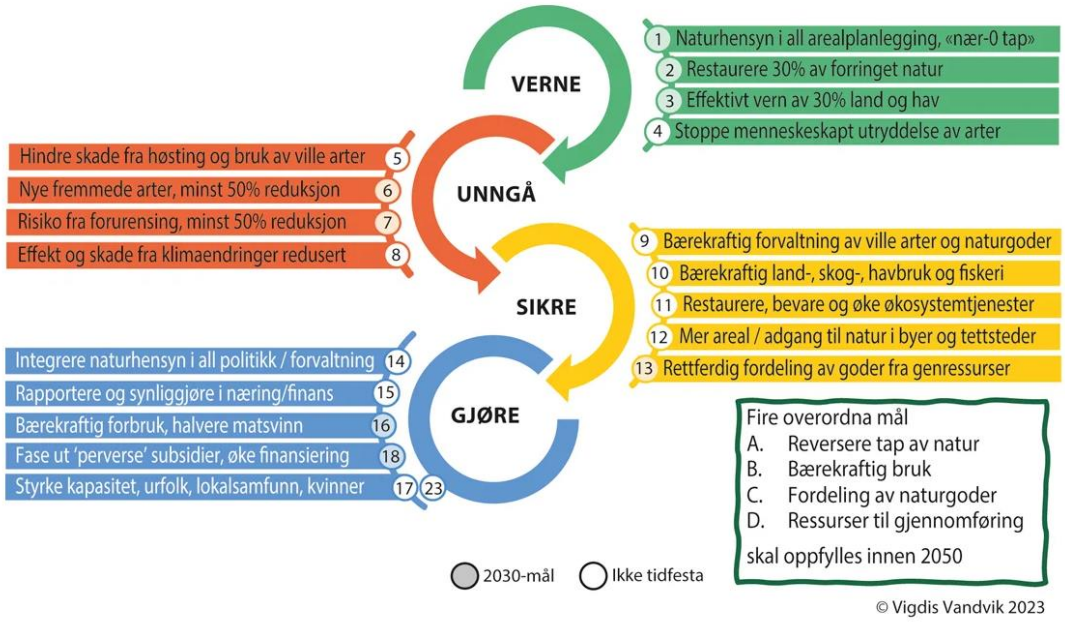
CONFERENCE OF THE PARTIES TO THE
CONVENTION ON BIOLOGICAL DIVERSITY
Fifteenth meeting – Part II
Montreal, Canada, 7-19 December 2022
Agenda item 9A

Kunming-Montreal Global biodiversity framework

Draft decision submitted by the President

The Kunming-Montreal Global Biodiversity Framework

- Global biodiversity framework
  - Kunming-Montreal Global Biodiversity Framework (cbd.int)
- Broad framework, global targets
- National Strategies and Action Plans should be developed
- A Norwegian white paper about the follow-up will be launched in the autumn of 2024.
- The previous action plan was adopted by the Parliament in 2016:
  - Meld. St. 14 (2015–2016) - regjeringen.no



Nature-based solutions

- Nature-based solutions included in targets 8 and 11 in the Global Biodiversity Framework

- Definition:
  - *actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits. (Fifth Session of the United Nations Environment Assembly (UNEA-5))*

- Nature-based solutions involve solving societal challenges by starting with natural processes and ecosystems. This is based on the use of nature or "mimicking" nature's own solutions.

Foto: Kristin Teien

What are nature-based solutions?

1. Protecting nature and robust ecosystems

   Example: Protection and management of carbon-rich areas such as old forest

2. Restoring degraded habitats and ecosystems

   Example: Restoration of wetlands

3. Restoration of natural functions

   Example: Reopening of streams and rivers

   Green areas that can soak up the water

   Green roofs and facades

   Establishment of rain beds

Nature-based solutions should mimic wild nature as much as possible and should be connected to existing nature as far as possible.

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Foto: Kristin Teien

Norwegian regulations of land use for climate adaptation and nature-based solutions

- **State planning guidelines** for planning of climte and energy, and climate adaptation:
  - Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning - Lovdata
  - Ensure that municipalities and county authorities **avoid or limit risks, vulnerabilities, and disadvantages**
- When planning new areas for development, it should be considered how climate change can be taken into account. Emphasis should be placed on **good overall solutions and safeguarding ecosystems and land use of significance for climate change adaptation**, which can also contribute to increased quality in outdoor areas.

- **Nature-based solutions should be used.** If other solutions are chosen, an explanation must be given as to why nature-based solutions have not been chosen. Examples: open waterways, overall blue-green structures, and proper stormwater management.
  - Vurdere naturbaserte løsninger - Miljødirektoratet (miljodirektoratet.no)

Illustration: Forsvarsbygg

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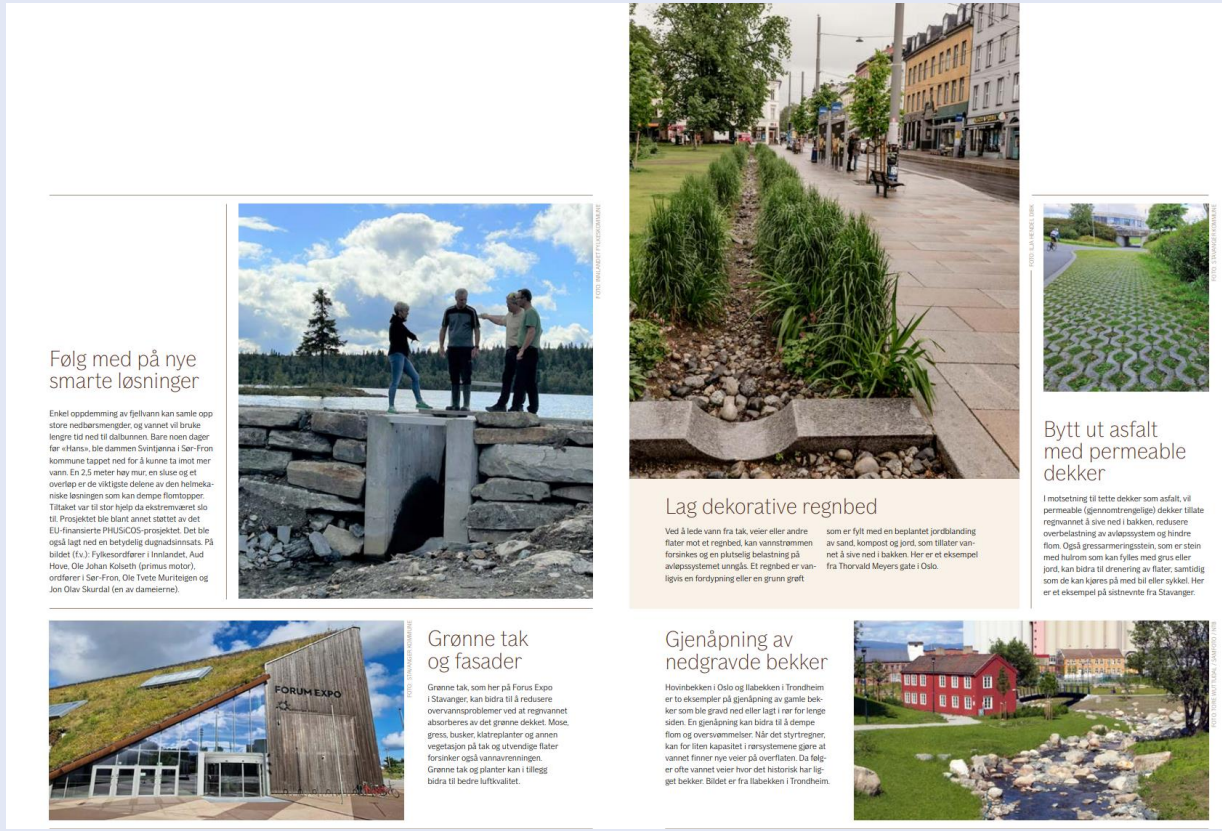
Thank you for your attention!

kristin.thorsrud.teien@cicero.oslo.no



Følg med på nye smarte løsninger

Enkel oppdemming av fjellvann kan samle opp store nedbørsmengder, og vannet vil bruke lengre tid ned til dalbunnen. Bare noen dager før «Hans», ble dammen Svintjønna i Sør-Fron kommune tappet ned for å kunne ta imot mer vann. En 2,5 meter høy mur, en sluse og et overløp er de viktigste delene av den helmekaniske løsningen som kan dempe flomtopper. Tiltaket var til stor hjelp da ekstremværet slo til. Prosjektet ble blant annet støttet av det EU-finansierte PHUSICOS-prosjektet. Det ble også lagt ned en betydelig dugnadsinnsats. På bildet (f.v.): Fylkesordfører i Innlandet, Aud Hove, Ole Johan Kolseth (primus motor), ordfører i Sør-Fron, Ole Tvete Muriteigen og Jon Olav Skurdal (en av dameierne).

Lag dekorative regnbed

Ved å lede vann fra tak, veier eller andre flater mot et regnbed, kan vannstrømmen forsinkes og en plutselig belastning på avløpssystemet unngås. Et regnbed er vanligvis en fordypning eller en grunn grøft som er fylt med en beplantet jordblanding av sand, kompost og jord, som tillater vannet å sive ned i bakken. Her er et eksempel fra Thorvald Meyers gate i Oslo.

Bytt ut asfalt med permeable dekker

I motsetning til tette dekker som asfalt, vil permeable (gjennomtrengelige) dekker tillate regnvannet å sive ned i bakken, redusere overbelastning av avløpssystem og hindre flom. Også gressarmeringsstein, som er stein med hulrom som kan fylles med grus eller jord, kan bidra til drenering av flater, samtidig som de kan kjøres på med bil eller sykkel. Her er et eksempel på sistnevnte fra Stavanger.

Grønne tak og fasader

Grønne tak, som her på Forus Expo i Stavanger, kan bidra til å redusere overvannsproblemer ved at regnvannet absorberes av det grønne dekket. Mose, gress, busker, klatreplanter og annen vegetasjon på tak og ulvendige flater forsinker også vannavrenningen. Grønne tak og planter kan i tillegg bidra til bedre luftkvalitet.

Gjenåpning av nedgravde bekker

Hovinbekken i Oslo og Ilabekken i Trondheim er to eksempler på gjenåpning av gamle bekker som ble gravd ned eller lagt i rør for lenge siden. En gjenåpning kan bidra til å dempe flom og oversvømmelser. Når det styrtregner, kan for liten kapasitet i rørsystemene gjøre at vannet finner nye veier på overflaten. Da følger ofte vannet veier hvor det historisk har liggett bekker. Bildet er fra Ilabekken i Trondheim.

European Conference of Defence and the Environment

ECDE 2024

DAGMAR HAGEN
Norwegian Institute for Nature Research

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NINA
Norwegian Institute for Nature Research

Ecosystem restoration to improve degraded ecosystems and mitigate climate change.

Example from large-scale restoration of a military training area into national park in Norway

Dagmar Hagen, NINA
Svein Solli, NDEA


Functioning ecosystem
is essential
Foto: A.B.Skrindo/NINA

Nature under pressure

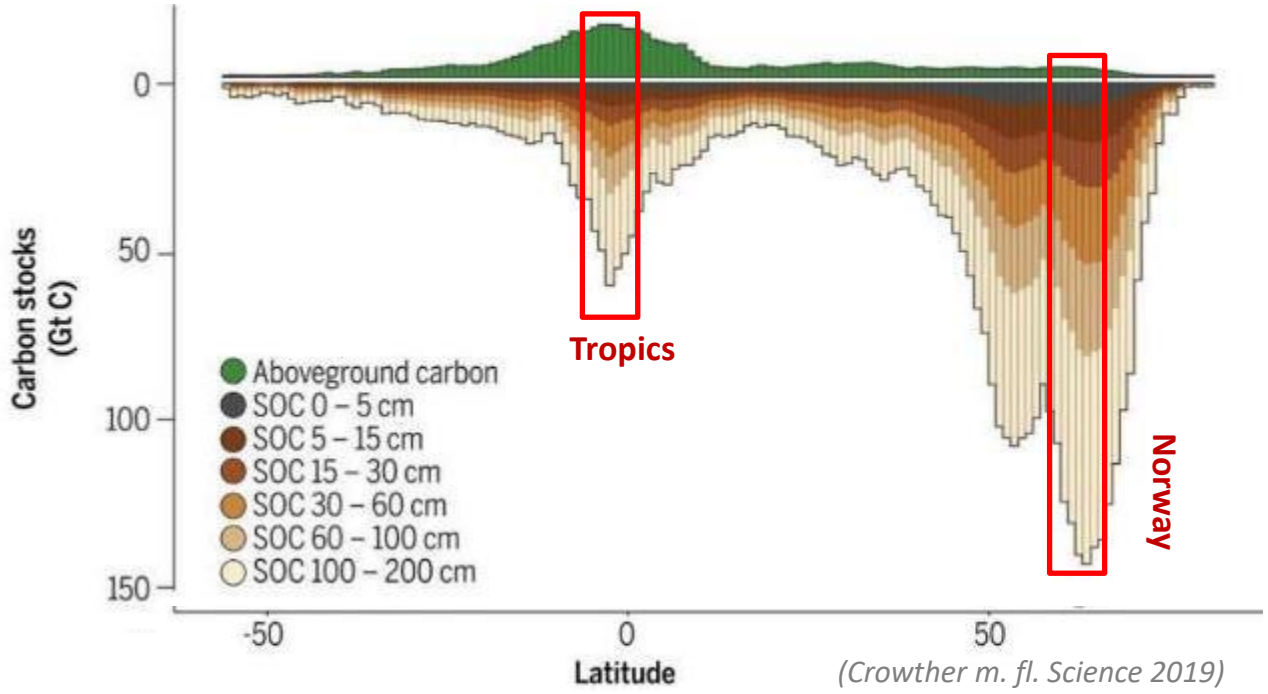
infrastucture, renewable energy, forestry, mining, recreation, military

- 75% of global land area severely altered
- 85% of global welands degraded
- 1 mill. species are threatened

IPBES 2019: knowledge gap on «impacts of war and conflict on nature and support of ecosystem services»

Climate change mitigation & nature & sustainability

- Intact nature areas are the best carbon-storage and carbon-capturing systems on earth



(Crowther m. fl. Science 2019)

Foto: M.O.Kyrkjeeide/NINA

Ecosystem restoration: a target, a goal and a tool

"any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state" (IPBES 2018)

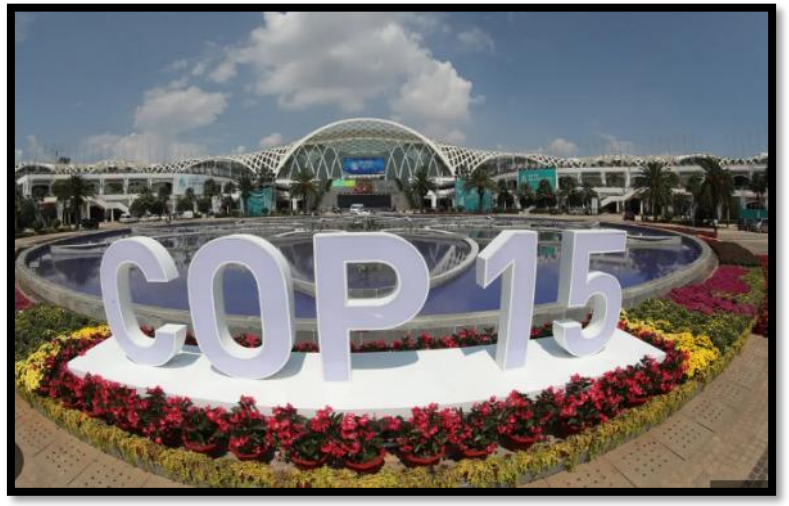
UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

2021 – 2030 UN Decade

"*aims to massively scale up the restoration of degraded and destroyed ecosystems*"

2022 Kunming-Montreal COP 15 target #2

"Have restoration completed or underway on at least 30% of degraded terrestrial, inland waters, and coastal and marine ecosystems [by 2030]



1923 – 2008

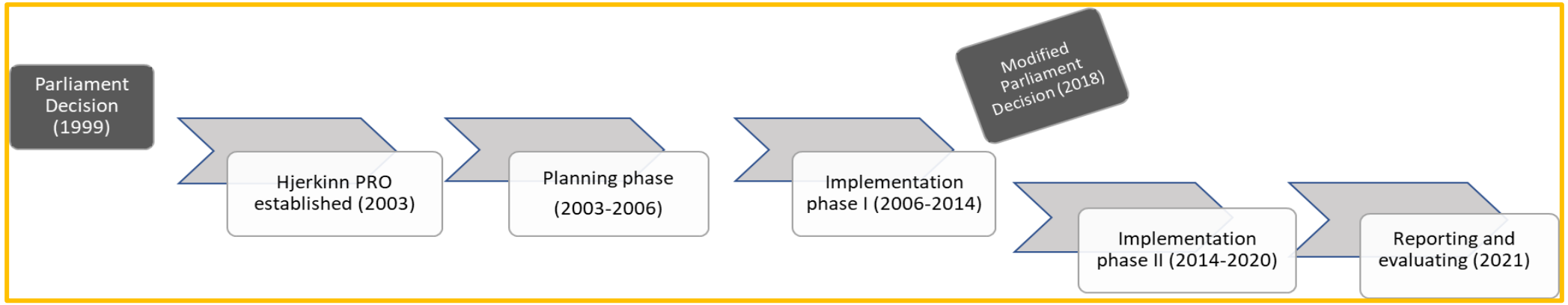
Norwegian Parliament 1999
restore to…

”considerable nature benefit”
”nature protection”
”civilian use”
”restore back to natural state”

Hjerkinn PRO 2003 - 2020

From military battlefield to National Park

FORSVARSBYGG



- Input
  - 165 km^2 area
  - Alpine landscape (1000 – 1700 m asl)
  - 100 years of heavy military use
  - 580 mill NOK (400 + 180)

- Crucial conditions
  - Large scale (size and complexity)
  - Unexploded ordnances – overall risk
  - Pollution (within area solutions)
  - Time (20 yrs project)

Guiding principles for ecosystem restoration at Hjerkinn

1. Promote natural processes and recovery

2. Avoid new disturbance during construction phase of the restoration

3. Restoration should show some immediate effects
(however, the long-term perspective must be communicated)

4. Zoom in – zoom out (integrate small and large scale perspectives during all restoration planning and implementation)

NINA
Norwegian Institute for Nature Research

Implementation

Remove roads and military infrastructure

- Reverse contruction
  - Planning
  - Tenders
  - Implementation
- Remote control
  - Safety
  - Technology
  - Quality

Green training

"a three-step model for communication and dialogue in developing quality on-site solutions for restoration

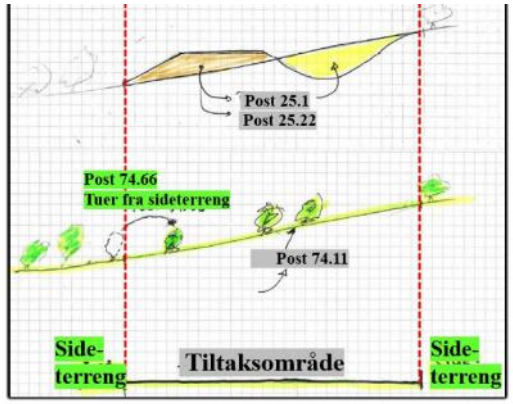
(Hagen et al. 2022. Journal for Nature Conservation)

Planning stage → **Implementation stage**

Formal preparation

- Project description
- Tender documents
- Expected quality
- Sphere of competence

PARTICIPANTS
Project owner (NDEA)
Technichal engineer / consultant
Restoration ecologist



Lecture and field inspection

- Classroom lecture; ecology, quality, consepts and common language
- Inspection in the field site
- Interactive clarification of expectations in the field

PARTICIPANTS
Restoration ecologist
Contractor (administration and all machine drivers)
Project owner (NDEA)

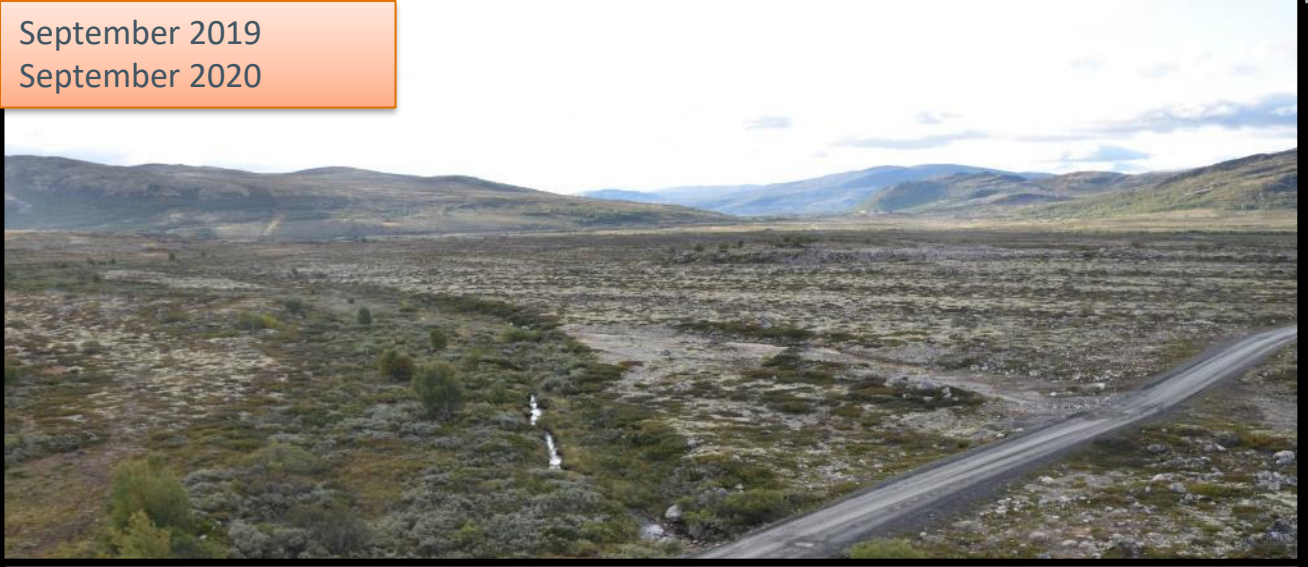
Dynamic dialogue

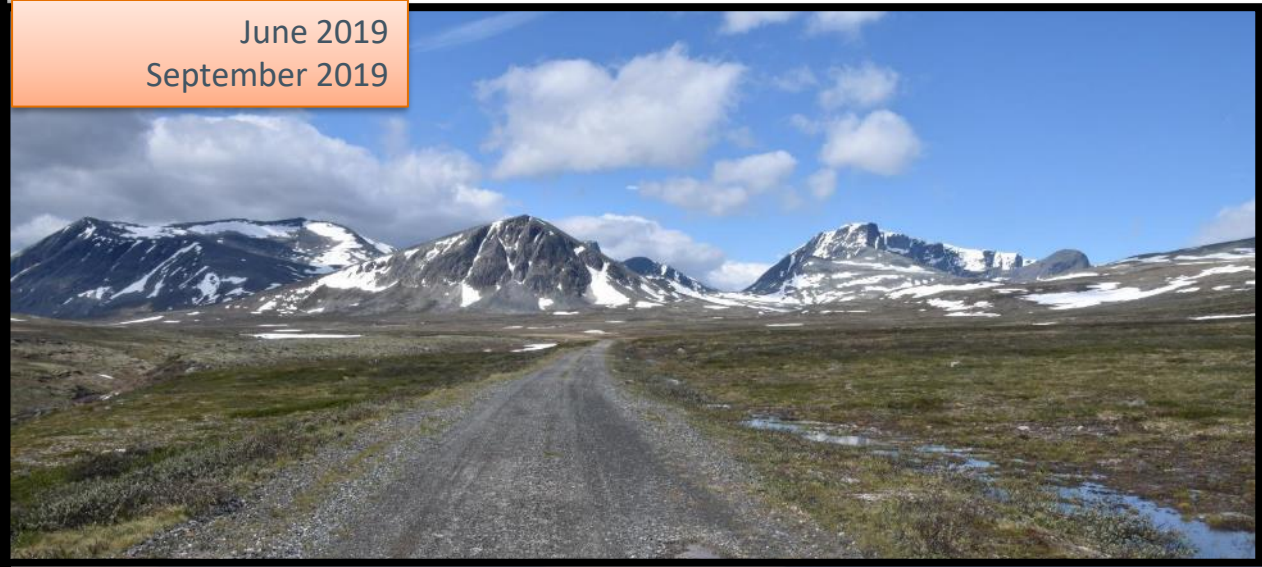
- Running dialogue
- On-site assessments for specific situations
- Dialogue for solutions, common language
- Further develop on-site techniques for improved output

PARTICIPANTS
Machine driver (-s)
Subject manager(-s) at NDEA
Restoration ecologist

NINA
Norwegian Institute for Nature Research


-Vi blir stort sett enige til slutt.
-Til slutt.


September 2019
September 2020


June 2019
September 2019

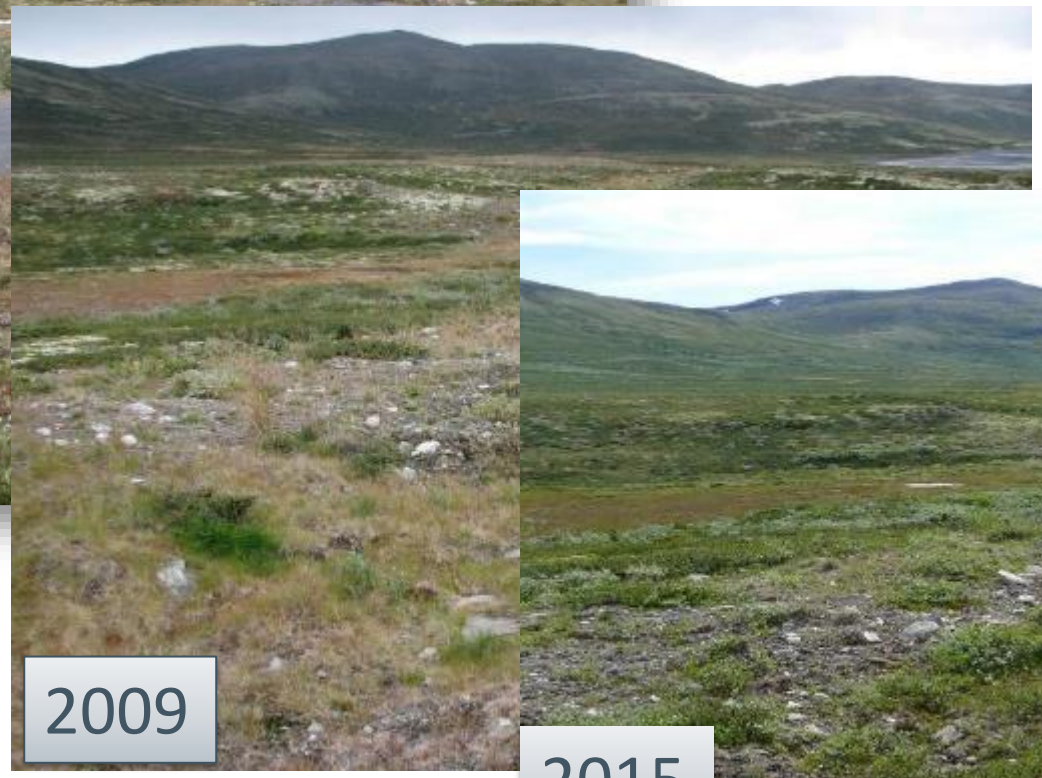

916


Festuca ovina

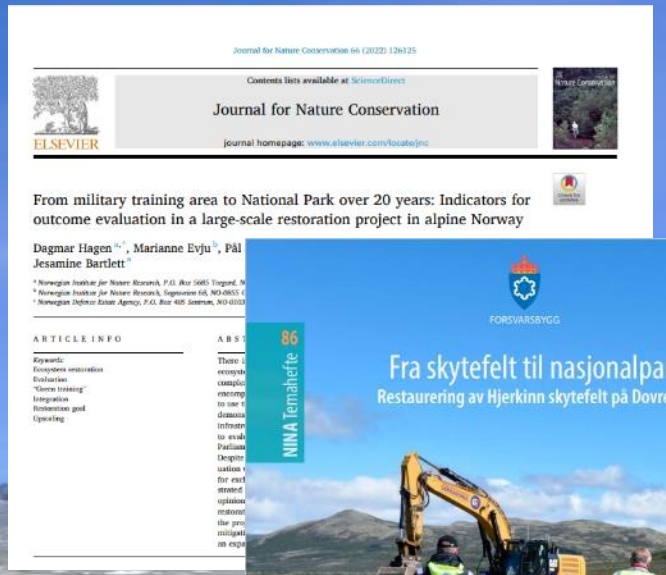

Juni 2017
August 2017
1. Promote natural processes and recovery
2. Avoid new disturbance during construction phase of th
restoration
3. Restoration should show some immediate effects
(however, the long-term perspective must be communicated)
4. Zoom in – zoom out (integrate small and large sca
perspectives during all restoration planning and
implementation)

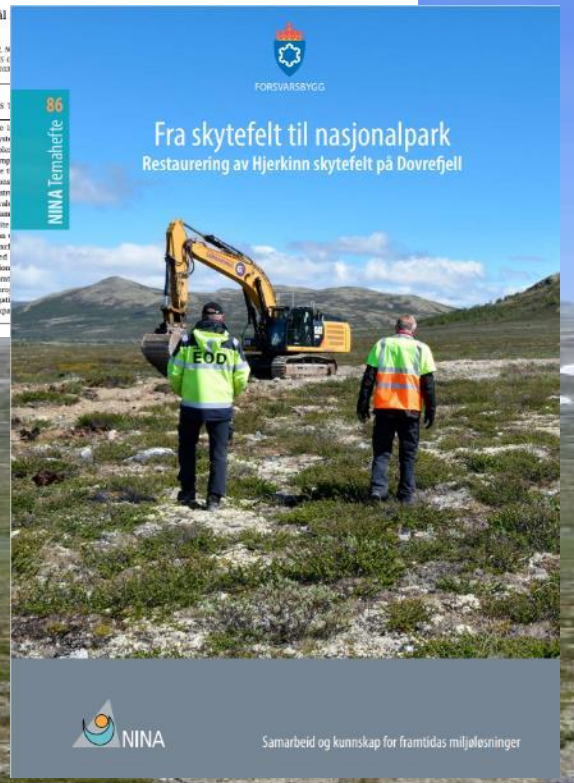
Quarry, gravel deposit

Testing and monitoring restoration

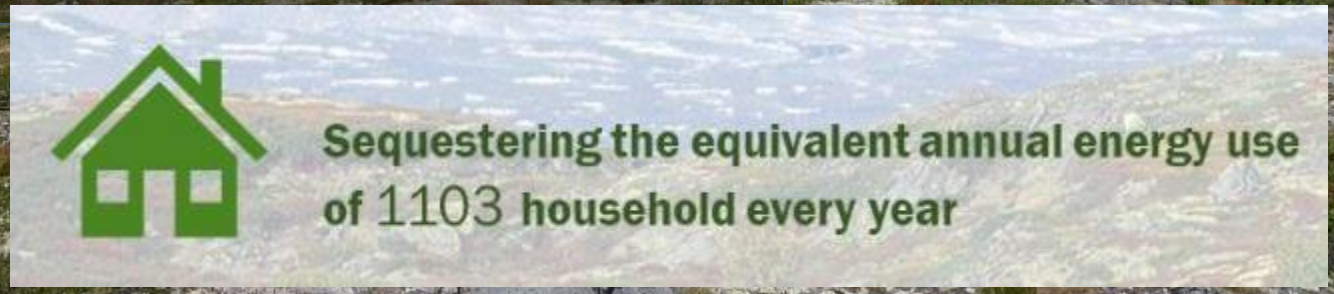


Measured outcome



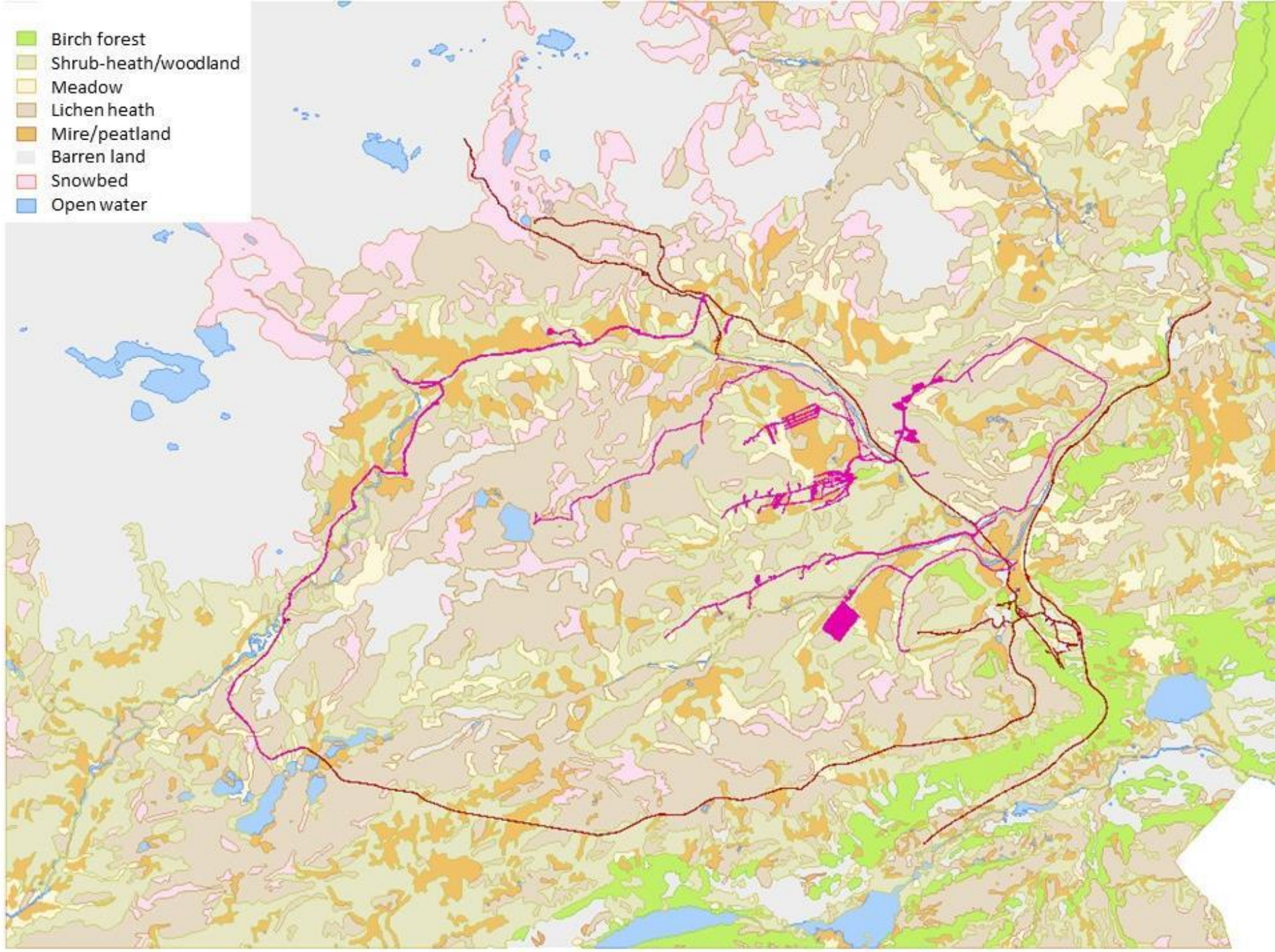


- 130 km² National Park
- 12,19 km² prime summer habitat for wild reindeer
- 19000 UXO og 540 tons garbage removed out of area
- 1103 houshold / yr carbon seq
- 47 000 native Salix planted

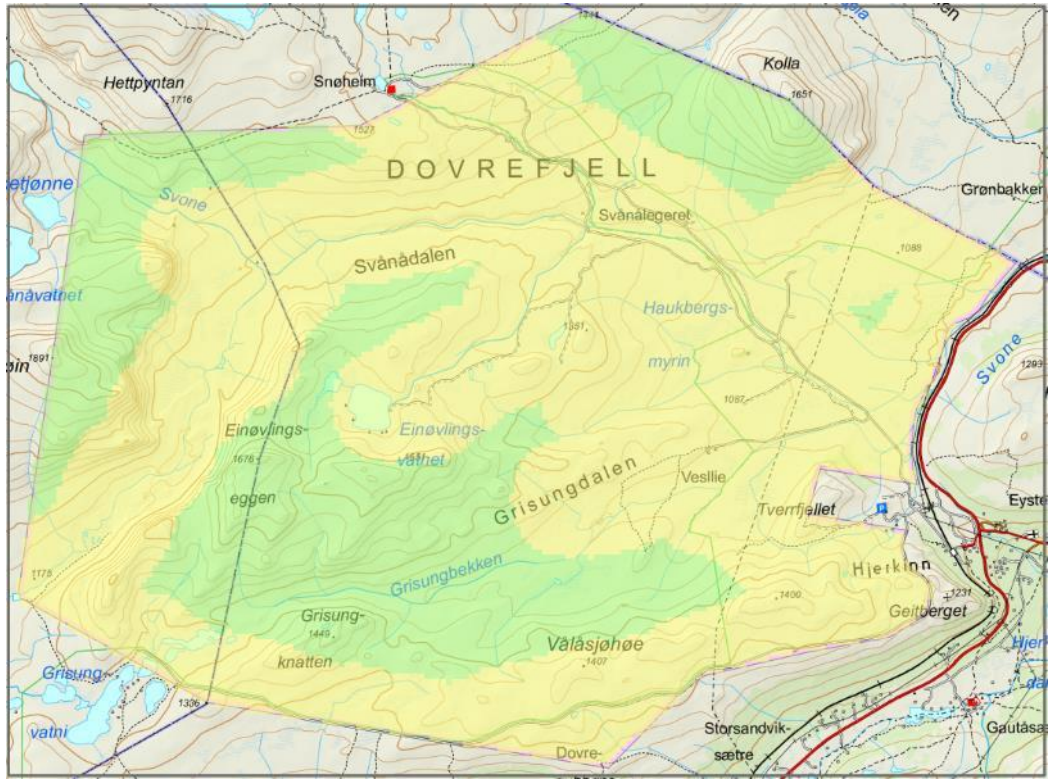


Habitat restoration

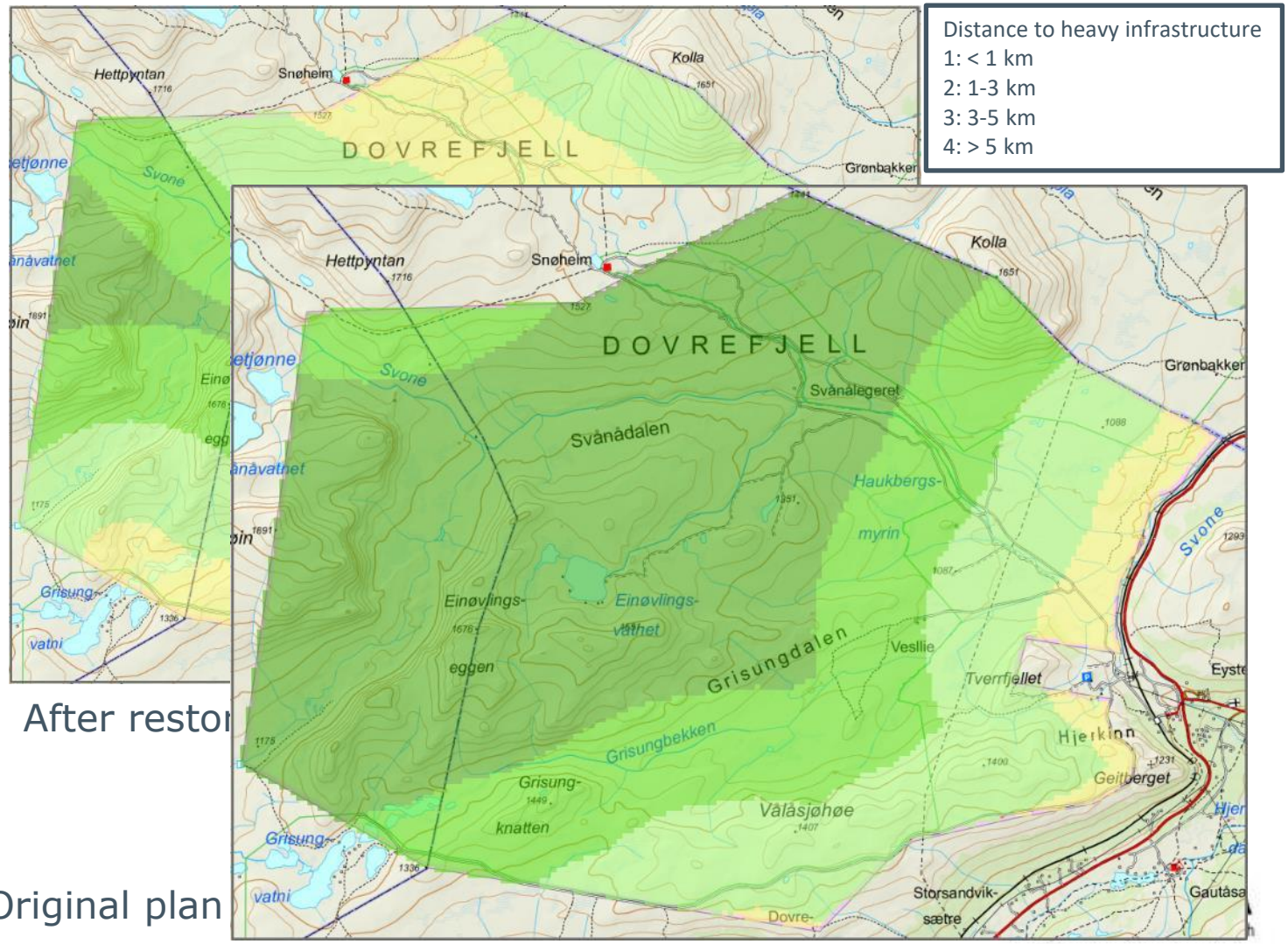
Habitat	Areal da	Share
Peatland	580	11%
Meadow	462	9%
Snowbed	34	< 1%
Birch forest	13	< 1%
Lichen heat	2428	46%
Shrub-heath	1697	32%



Interference-free area



Before (during military use, 2003)



After restor

Original plan

Distance to heavy infrastructure
1: < 1 km
2: 1-3 km
3: 3-5 km
4: > 5 km

Knowledge transfer – across businesses, countries and ecosystems

- Goal formulation – planning – implementation - measure outcome
- Science + practice = 💙
- Share good and bad experiences and develop solutions
- Communicate
- Complete it!

Methods

Solutions

Cooperation

Goal formulation

Codes of conduct

NINA
Norwegian Institute for Nature Research

NINA
Norwegian Institute for Nature Research

FORSVARSBYGG

dagmar.hagen@nina.no
svein.solli@forsvarsbygg.no

Ecosystem restoration and global commitments (IPCC, IPBES, UNEP, WEF/WB)

- Climate change mitigation
- Reverse biodiversity loss
- Human health and wellbeing
- Reduce nature risk and social vulnerability

European Conference of Defence and the Environment

ECDE 2024

COLM CASSERLY
cbec Europe

EUROPEAN
CONFERENCE OF
DEFENCE AND THE
ENVIRONMENT

Nature-based solutions for river environments: case studies from Norway, Iceland and UK

13 June 2024

Colm M Casserly
cbec Europe

European Conference of Defence and the Environment - Oslo

Climate Change

Wetter Winters

- Increase in frequency and magnitude of high-low events (risk to infrastructure)

Drier Summers

- Reduction in summer low flows (droughts/thermal stress/habitat loss)

Non-typical Events

- Extreme rainfall events during the summer (Eco-system stress)

Military Assets - Requires long-term vision

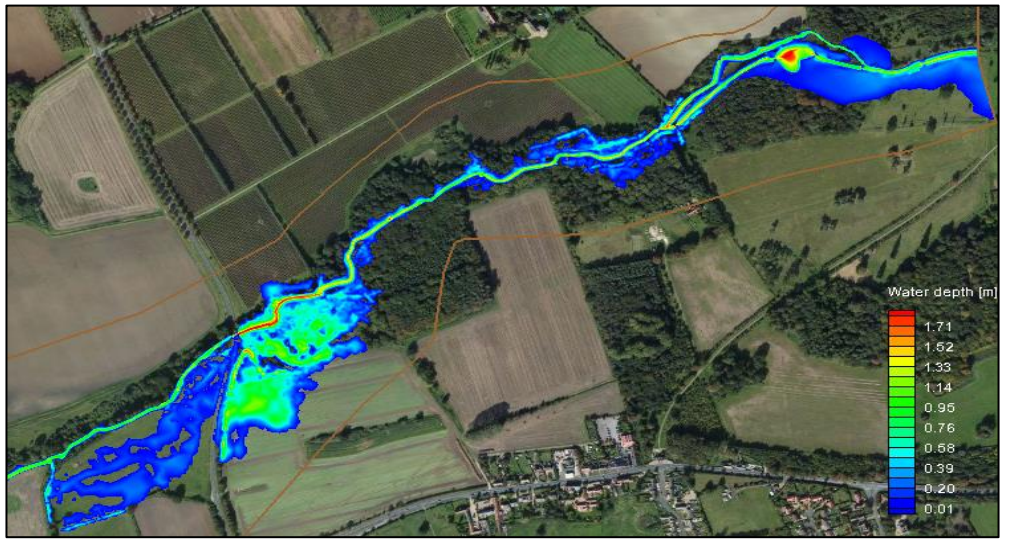
What can we do?

- We can design resiliency into our landscapes

Multiple overlapping benefits – Asset protection, carbon storage, Habitats, WFD

Flood Management

NatureScot
NàdarAlba



Drawbacks of Traditional Approaches

- High capital costs
- Ecological degradation

➔ Increase flood risk elsewhere

Catching & detaining water where it falls

- Slow the flow!

Increase catchment roughness

- Reduce drain density
- Reforestation / Riparian

Construct space for water

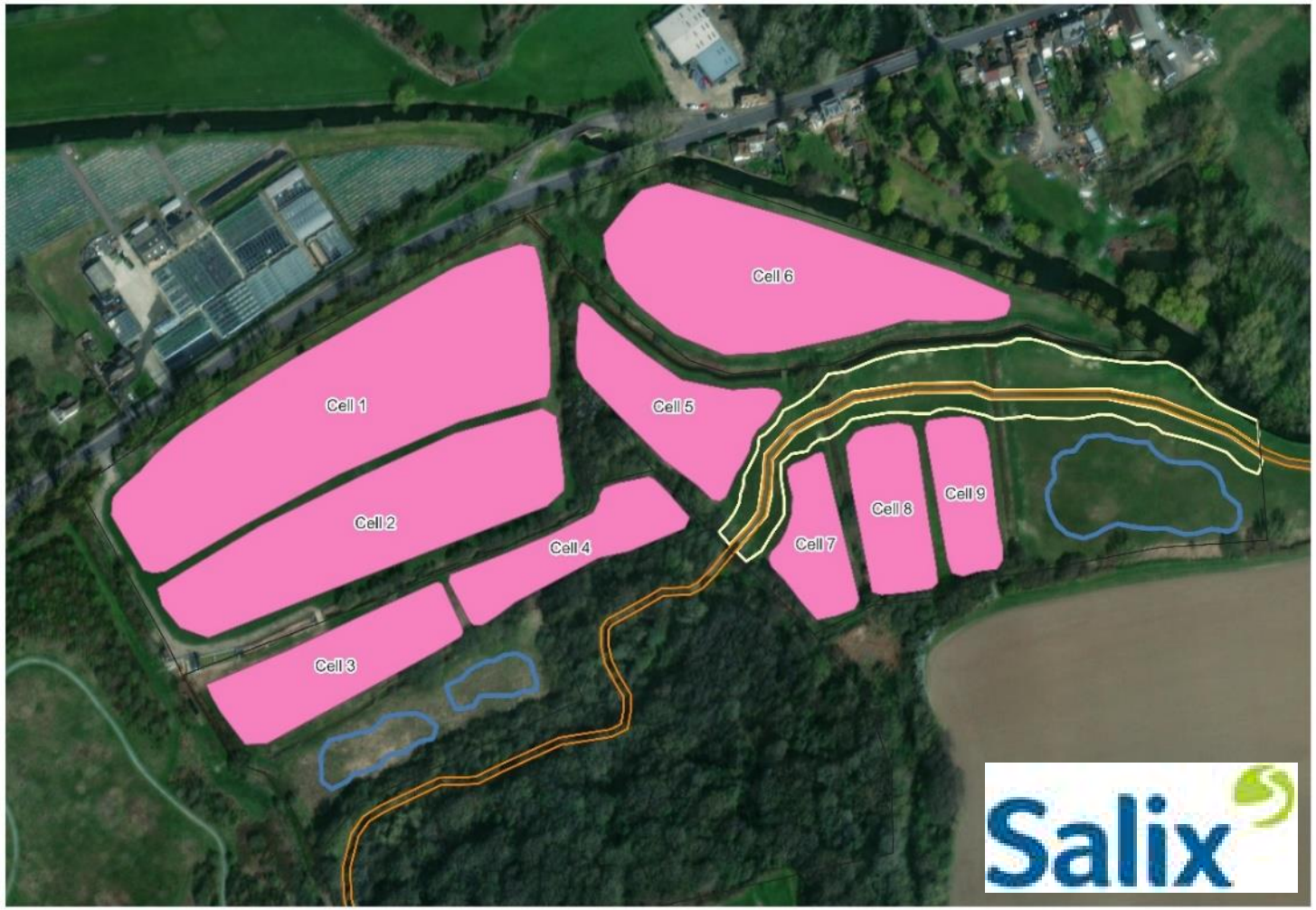
- Wetlands, backwaters
- Water quality benefits

Beltie Burn, Aberdeenshire (2019-2020)

UK Ministry of Defence Property

Design treatment wetlands

- System of cells – Heavily planted
- Pollutants are safely emitted to the atmosphere or 'locked' into the sediment
- Can treat run off from military installations
- Designed to account for climate change



Sturry ICW – River Stour, Canterbury, England

Assisted Recovery (700 m)

- Removal of flood embankments
- Large Wood Placement
- Gravel Augmentation

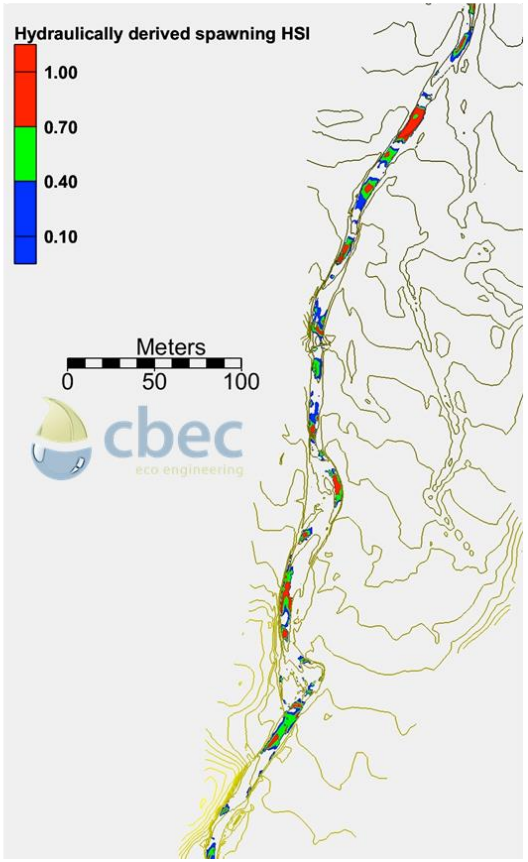
Allt Lorgy, Scotland

Results

- Increase in spawning habitat

Ecological Benefits

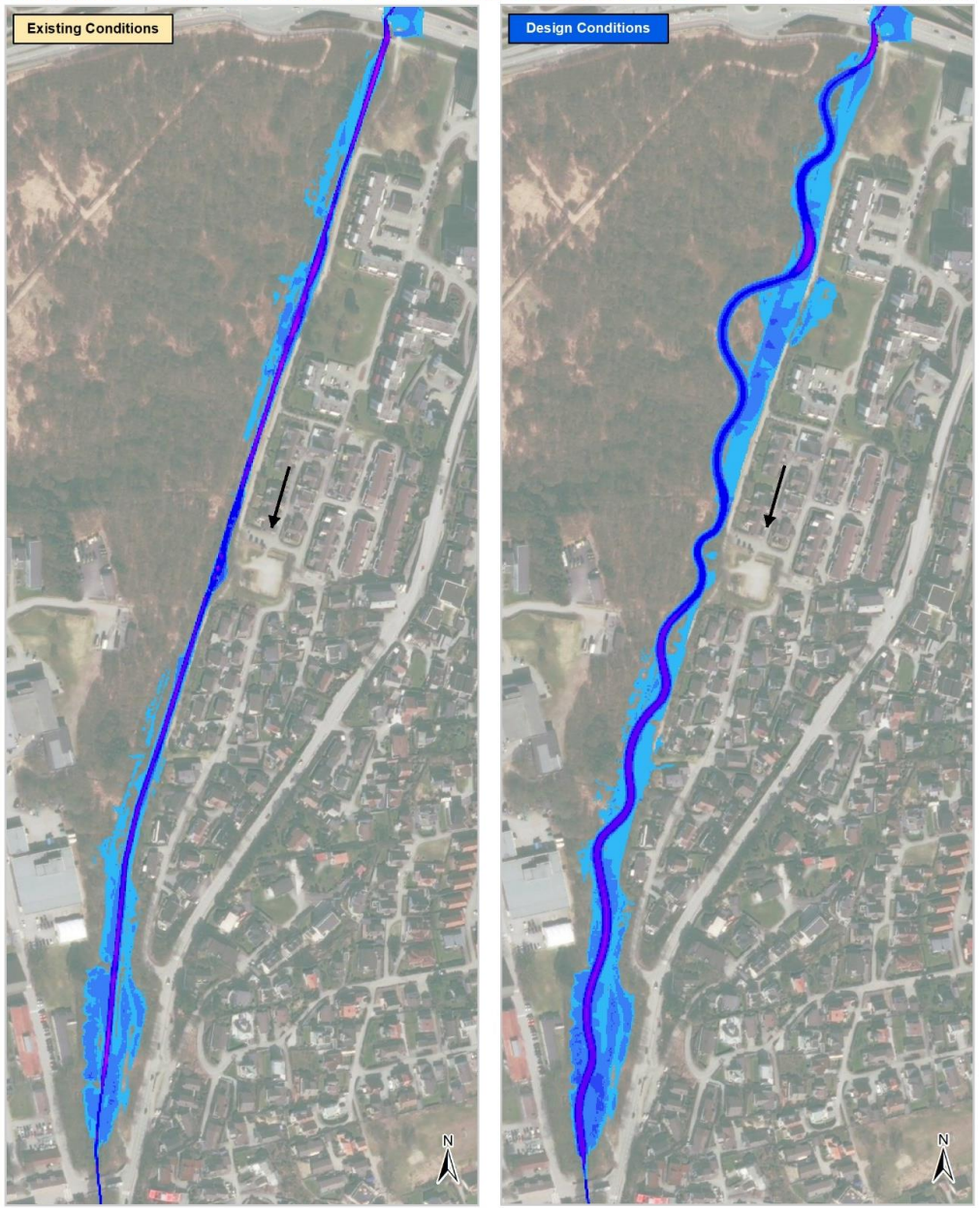
2014 MODELLED SPAWNING HABITAT



HSI	2011	2014
>0.50	14%	23%
>0.75	4%	8%

2011-13 = 0 redds
2014 = 5 redds
2015 = 11 redds
2016 = 14 redds
2017 = 31 redds
2018 = 29 redds

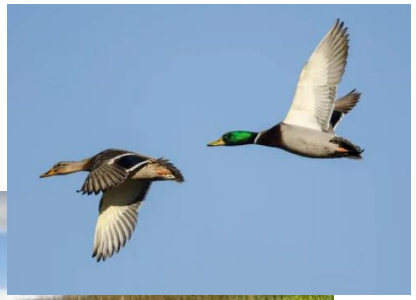
STAVANGER - MODEL RESULTS - 2 YEAR RETURN PERIOD



Møllebekken, Norway

Constraints

- Military base
- Urban infrastructure
- Airfields
- **Other assets (Bank protection)**



Green Burn, Near Aberdeen Airport

Hard Bank Protection (rip-rap, rock revetment, boulders, gabions, concrete)

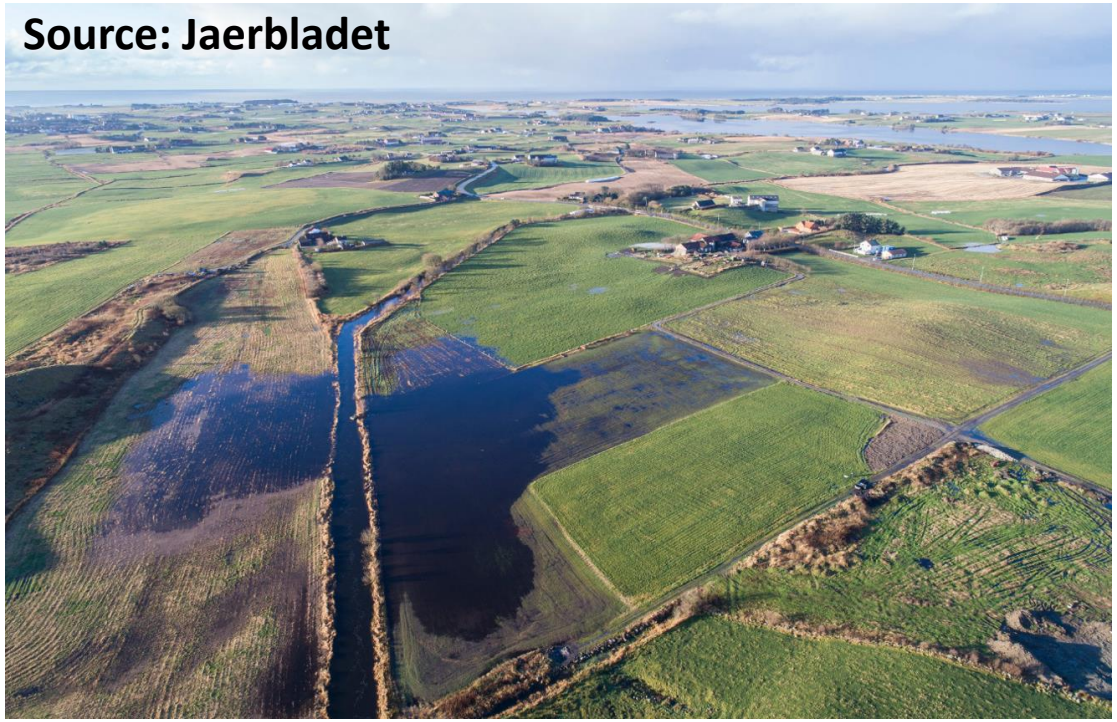
- Not natural (or sustainable)
- Deflects erosive power elsewhere
- Often fail – undermining or out-flanking

Large Wood Structures

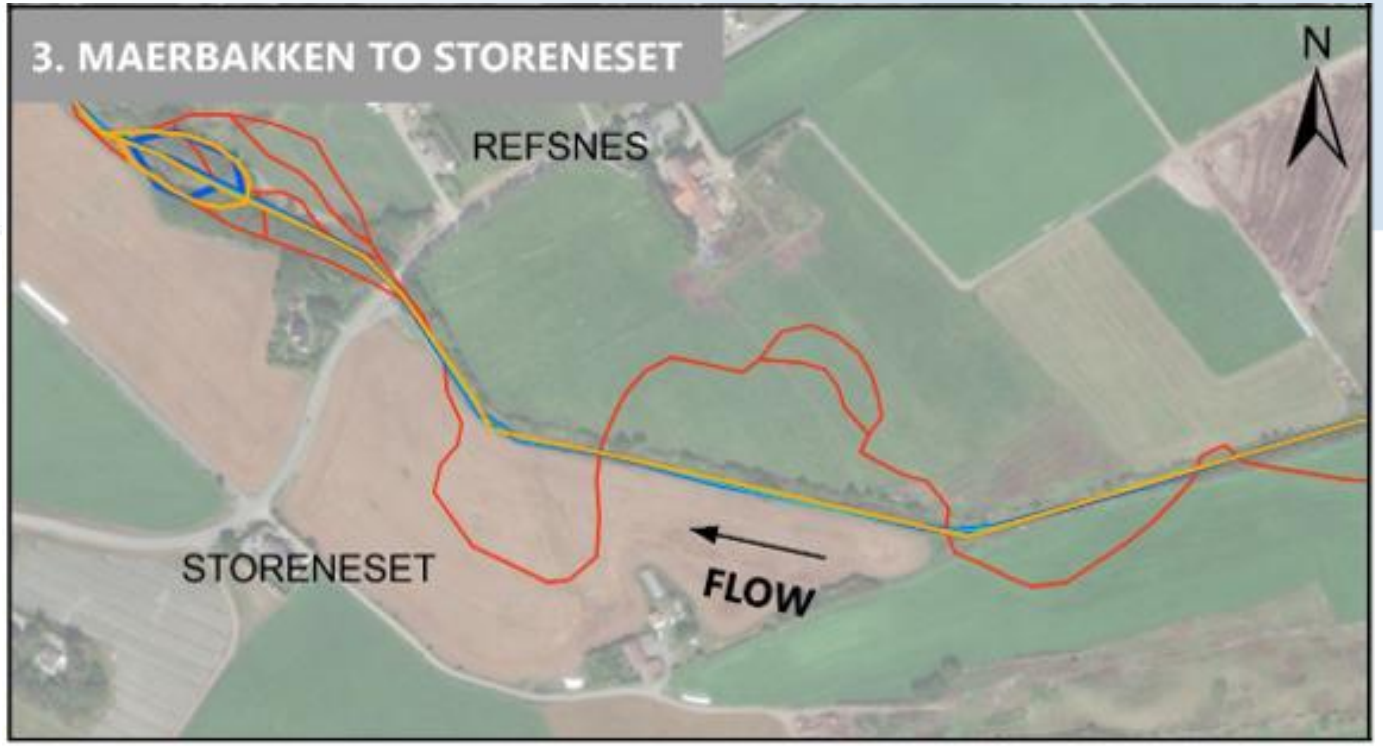
- Natural Material – How bank naturally stabilise
- Habitat benefits
- Generally cheaper to implement
- Energy dissipation
- Climate resilient - Deforms / adjust as channel shape evolves

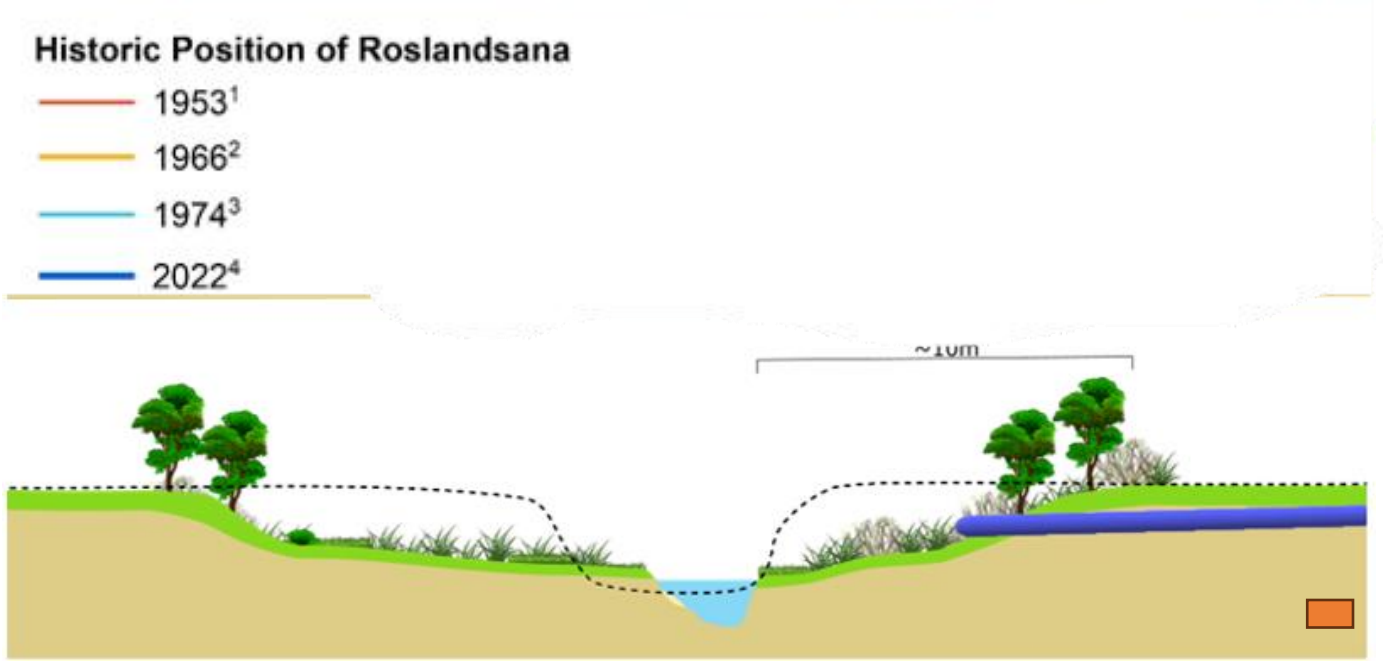
Andakílsá River, Iceland

Source: Jaerbladet



- Channelised in 1950s
- Problems with flooding
- Erosion issues
- Desire to dredge again
- Degraded habitat





Thank you for your attention!

admin@cbecoeng.ie

East Tullos Burn (2012-2014)

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TIMO KANERVA
Defence Properties Finland

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SENAATTI

Adaptation to Climate Change – A study of impacts on state properties

ECDE 2024

Timo Kanerva
Sustainability Director, Defence Properties &
Senate Properties Finland

Contents

1. Senate Group
2. Key risks of climate change for property owners
3. Adaptation and risk management
4. Case: Risk of flooding
5. Conclusions

Work environment partner of the Finnish government

- The Finnish Government's internal service centre and an unincorporated state enterprise under the Ministry of Finance
- We look after the State's properties, build new buildings, renovate and repair old ones and develop and sell buildings no longer required
- We ensure that premises intended for use by the Defence Forces are available without disruption in all security situations and emergencies

Senate Group

SENAATTI	Shared services and processes	PUOLUSTUSKIINTEISTÖT Senaatti
Senate Properties Central government property specialist and facilities partner, responsible also for the development and sale of government properties.	Synergies and cost benefits are achieved through shared administrative services and processes across the group.	**Defence Properties Finland** Strategic partner of the Finnish Defence Administration for properties and associated services in all security situations.

Senate Group in figures

Buildings
8 500

Premises
5 900 000 m²

Total turnover
967 M €

Investments
657 M €

Customers
100 000

Balance sheet
5,3 bn €

Premises user satisfaction
75 %

Group employees
1 290

Key risks of climate change for property owners

Adaptation plan for climate change

- According to the real estate strategy, Finnish state property owners must have a plan for preparing for and adapting to climate change in the long and short term.
- A climate change adaptation plan was prepared in autumn 2022 – spring 2023.
- The plan was drawn up for the entire Senate Group.

Objectives:

1. Identify the most significant climate risks for the real estate sector and the means by which they can be managed
2. Define the key measures to adapt to the impacts of climate change
3. Identify buildings located in flood risk areas

Key impacts and risks of climate change in Senate's operating environment

Flooding and heavy rain

Increased rainfall, heavy rainfall, rising sea levels and melting snow cause an increase in flood risks, which has financial consequences.

Moisture stress for buildings

Increased rainfall, rising temperatures and increased cloudiness increase the moisture stress of buildings, which affects the service life and healthiness of buildings. Important from an economic, health and safety perspective.

Heat

Rising temperatures and the heat island effect puts a strain on building services technology and increases the need for cooling. Significant from the point of view of health and well-being.

Disturbances for operative functions

Extreme weather phenomena affect operations, for example, through disturbances in electricity and heat distribution and various property damage cases.

Changing market and expectations

Climate change causes changes in global markets and stakeholder expectations, which affects, for example, in the availability and costs of materials. This may have significant financial impacts.

Other impacts and risks of climate change on the real estate sector

Changes in soil bearing capacity

The increase in precipitation causes changes in the bearing capacity of the soil, which further weakens the storm resistance of various structures.

Changing winters

The rise in the average winter temperature, temperature fluctuations above and below zero, the increase in precipitation. These increase e.g. slipperiness and darkness, and decrease the need for heating and ploughing.

Biodiversity loss

The changing climate and densification of cities accelerate biodiversity loss.

Changing lifestyles

Climate change challenges consumer culture, and a sustainable lifestyle also applies to the real estate sector.

Climate fugitives

The deterioration of living conditions in certain areas may increase the flow of refugees to Nordic countries. This may indirectly affect the real estate sector through customers' changing space needs.

Adaptation and risk management

Example 1: Flooding and heavy rainfall

SENAATTI

Changes

Rainfall

Heavy rain, extreme weather events

Temperature

Consequences

Sea level

Rain intensity

Rain and melt waters

Freezing-melting -cycle

Storm water flooding

Flooding of water bodies

Effects

Structural damage

Personal property damage

Cleaning expences

Building services

Underground facilities

Indirect effects via infrastructure

Costs

Risk management tools

- ✓ **Stormwater flood risk mapping and management measures**
- ✓ **Operating models and guidelines for flood situations**
- ✓ Snow space reservation per block, melt water management
- ✓ Dimensioning and renovation of the stormwater system.

Current building stock

- ✓ **Definition of flood protection measures for properties located in flood risk areas**
- ✓ **Checking the drainage capacity,** water diversion and backup system functionality of flat roofs and terraces
- ✓ Separation of mixed sewerage (stormwater and wastewater)
- ✓ Updating maintenance methods and know-how
- ✓ Dimensioning property maintenance in changing conditions

Newbuilds and renovations

- ✓ **Flood risk areas and landscape must be taken into account in the planning phase.** The lowest safe building heights are changing.
- ✓ **Construction of flood defences in risk areas**
- ✓ Use of materials resistant to stagnant water
- ✓ Identifying and avoiding risk structures
- ✓ **Increased need for stormwater management in underground facilities**
- ✓ Water-pressure-resistant basement structures in flood risk areas
- ✓ Relocation of vulnerable spaces to upper floors
- ✓ **Green structures for delaying/absorbing stormwater**
- ✓ The permeability of surfaces must also be taken into account, for example. on large fields

Example 2: Heat

SENAATTI

Changes

Temperature

Consequences

- Heat ↑
- Heatwaves ↑
- Dryness ↑
- Heat island effect ↑

Effects

- Users suffering from heat, especially sensitive groups ↑
- Stuctural damage ↑
- MEP systems stress (mech, electr, plum) ↑
- Cooling need ↑
- Heating need ↓
- Moisture stress from cooling ↑

Risk management tools

- ✓ Tree conservation, planting and landscaping

Current building stock

- ✓ Reassessment of cooling needs to maintain indoor conditions at agreed levels

Newbuilds and renovations

- ✓ **Overheat protection as a design basis**
- ✓ **Layout and orientation of premises**
- ✓ **Structural solar protection**
- ✓ Passive use of solar energy
- ✓ Adjustable solar protection
- ✓ Mechanical cooling
- ✓ Possibilities to manage indoor conditions at sites where people stay around the clock
- ✓ Taking working in hot conditions into account in construction projects (occupational safety)

Example 3: Moisture stress

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Changes

Rainfall

Cloudiness

Temperature

Consequences

Moisture stress ↑

Mold damage ↑

Microbial damage to facades ↑

Drying of structures ↓

Effects

Building Life-span ↓

Renovation needs ↑

Health and well-being ↓

€

Risk management tools

Current building stock

- ✓ **Condition surveys and repair plans**
- ✓ Inspections of roof and façade structures
- ✓ **Identification of risk structures**
- ✓ Ensuring dewatering of containment rooms (pumps, alarms)
- ✓ Updating maintenance methods and know-how in changing conditions

Newbuilds and renovations

- ✓ **Building location and floorplan**
- ✓ Simplicity and reparability
- ✓ Weather protection during construction phase
- ✓ **Moisture protection** (e.g. wide eaves, ventilation of the roof and exterior cladding, high plinth, moisture-resistant wind protection materials)

Case: Risk of flooding

Flood risk survey

- A flood risk survey was conducted to determine which state-owned properties and buildings are located in flood risk areas.
- Purpose of mapping of the entire property mass was to **determine the extent of flood risks** and **identify the need for adaptation measures** in risk areas.
- The survey was based on public information on flood hazard and flood risk maps prepared by Regional Environmental Authorities (ELY Centres).

Some results:

1

Inland water body floods

- **17** buildings in the risk area for rare flooding (1/100 yrs)
- **24** buildings in the risk area for extremely rare flooding (1/250 yrs)

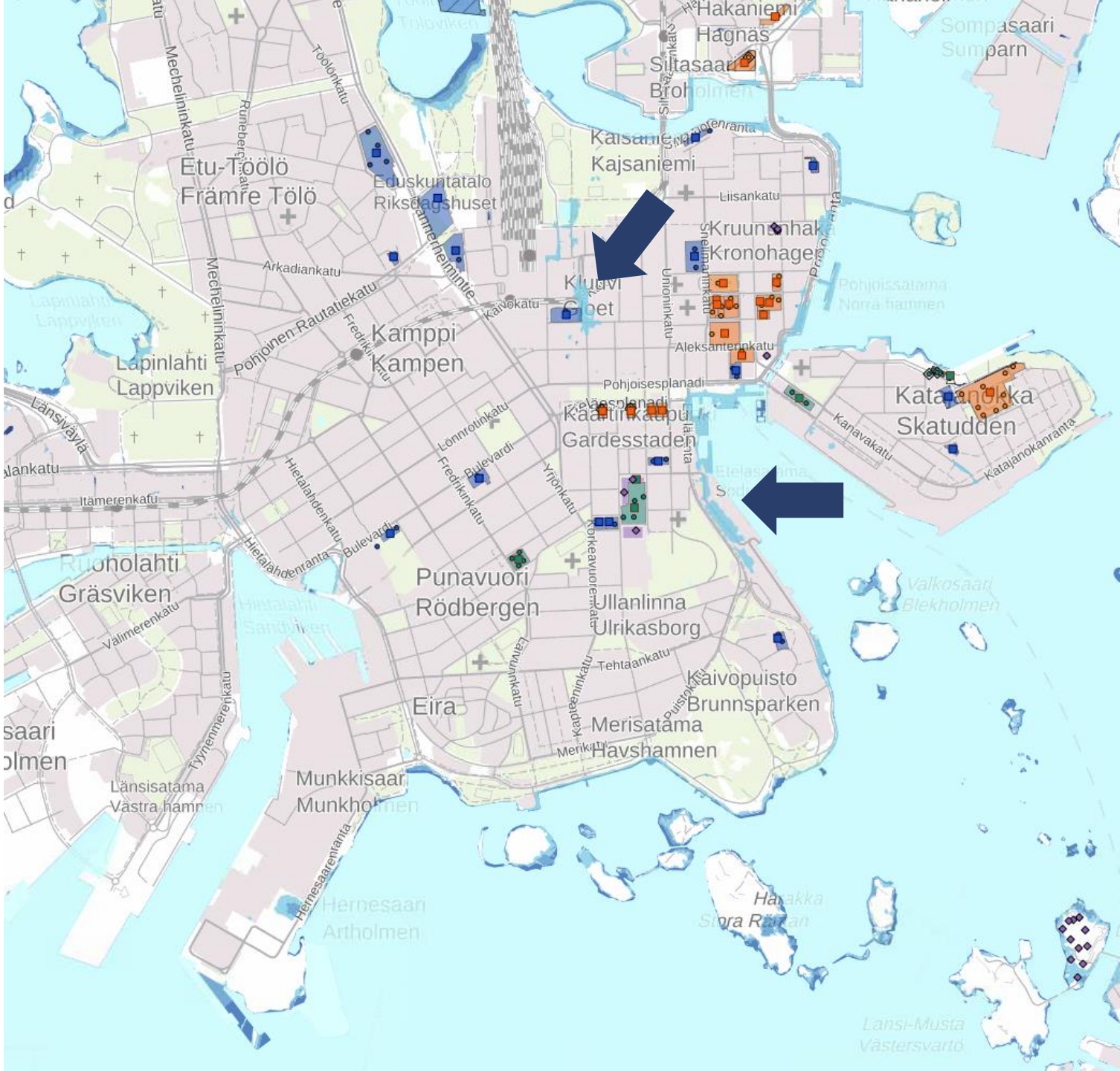
2

Sea water floods

- **32** buildings in the risk area for rare flooding (1/100 yrs)
- **34** buildings in the risk area for extremely rare flooding (1/250 yrs)

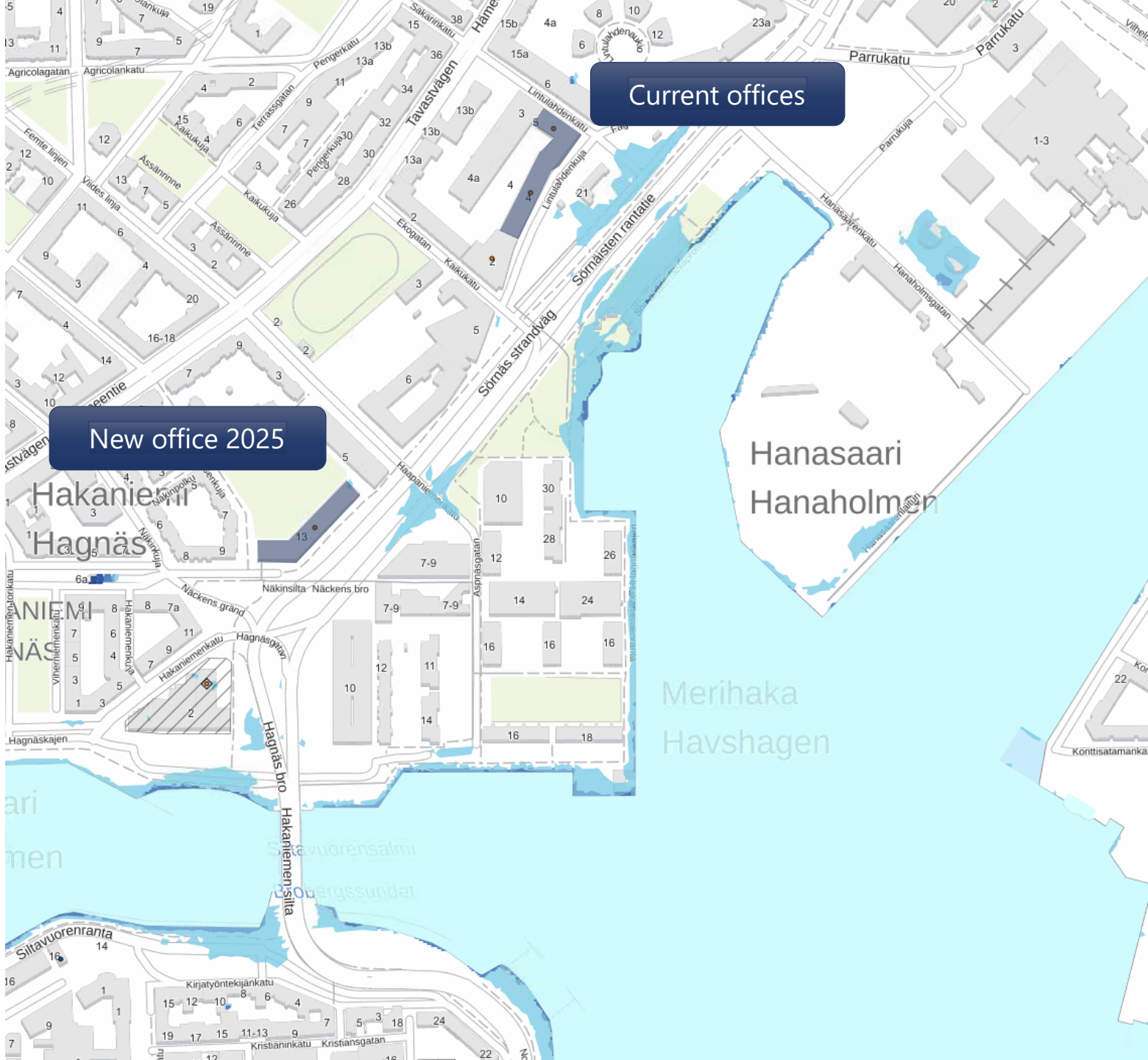
Examples:
Helsinki City Centre

- Flooded areas in risk at **rare flooding** (1/100 years)
- Several areas at risk on the coastline and also in certain areas inside the town



Senaatti main offices

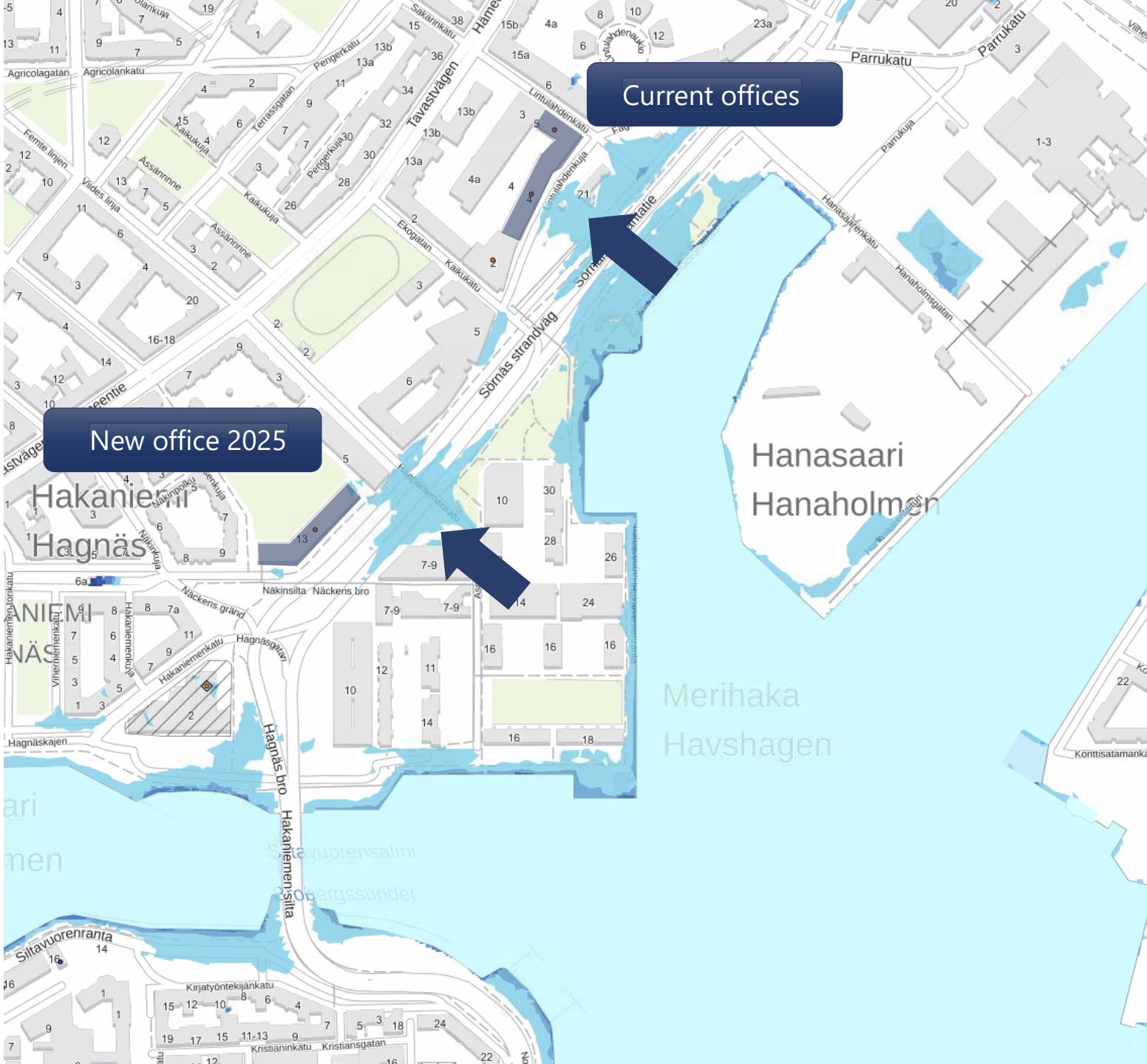
- Flooded areas in risk at **rare flooding** (1/100 years)
- Senaatti's main offices are currently located at Lintulahdenkuja 4.
- New shared office premises at Sörnäisten Rantatie 13 from 2025.
- Severe flooding estimated already at 1/100 flood scenario.



Senaatti main offices

- Flooded areas in risk at **extremely rare flooding** (1/250 years)
- Flood water would cover large areas near Senaatti's premises.
- Floodings has to be taken in to condsideration when planning the new premises.

- **Note:** climate change will change also the propability of extreme weather and flooding!



Conclusions

Key actions at Senate Group

- Climate risk management included in the planning process of construction projects
- Impacts of climate change addressed in property management
  - Possible increase in the need for cooling.
  - Prevention of slipperiness
  - Effects of extreme weather events (rainfall, winds, temperature)
- Moisture stress and risk structures included as part of regular building inspections.
- Stormwater flood risk mapping will be conducted
- The rescue plans of properties located in flood risk areas are complemented with instructions for flood situations.

Be prepared!

- Adaptation to climate change is one of the key challenges property owners have to address in the future.
- A study and risk assessment of the most significant climate risks for your real estate portfolio will
  - Improve awareness
  - Help to prepare and be resilient
  - Save costs in the long term.

SENAATTI

Thank you!