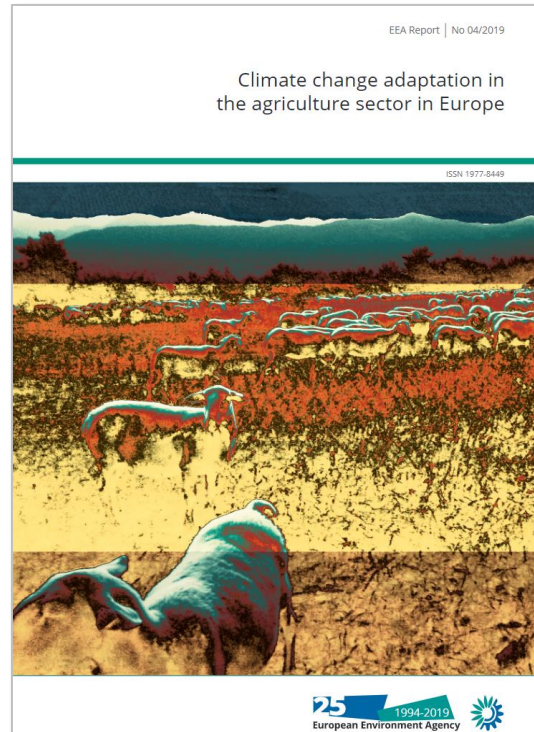


Nature-based solutions for disaster risk reduction and climate change adaptation



Ybele Hoogeveen, European Environment Agency

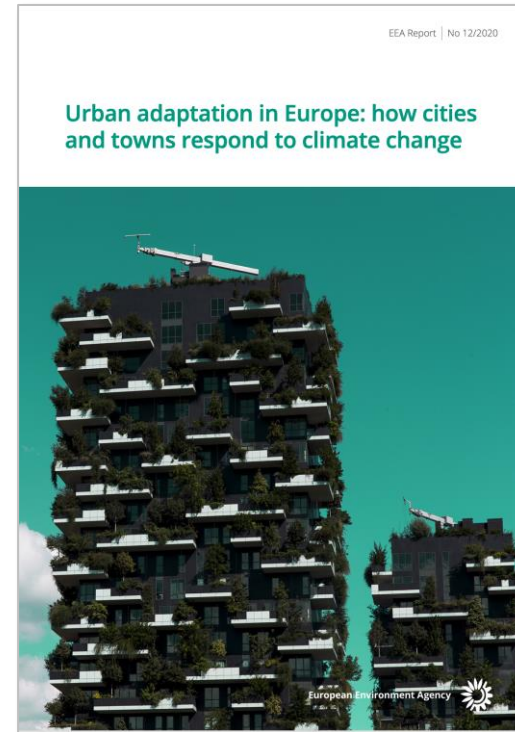
Relevant sources



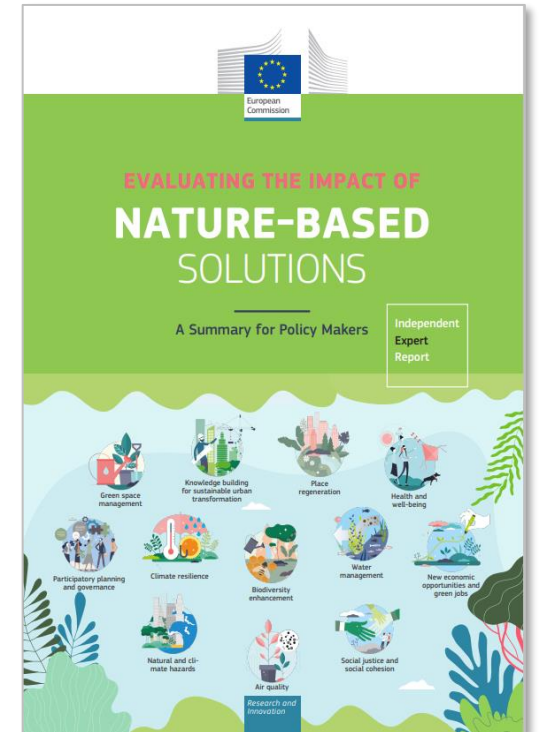
NBS in agriculture



NBS in policy frameworks and case studies

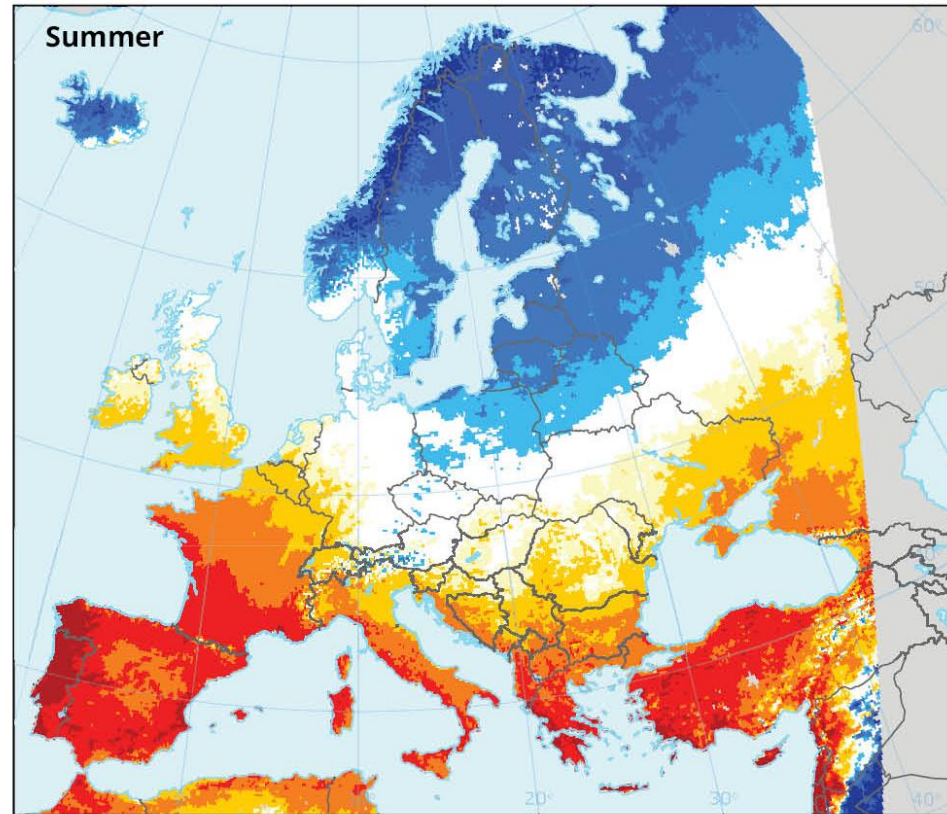
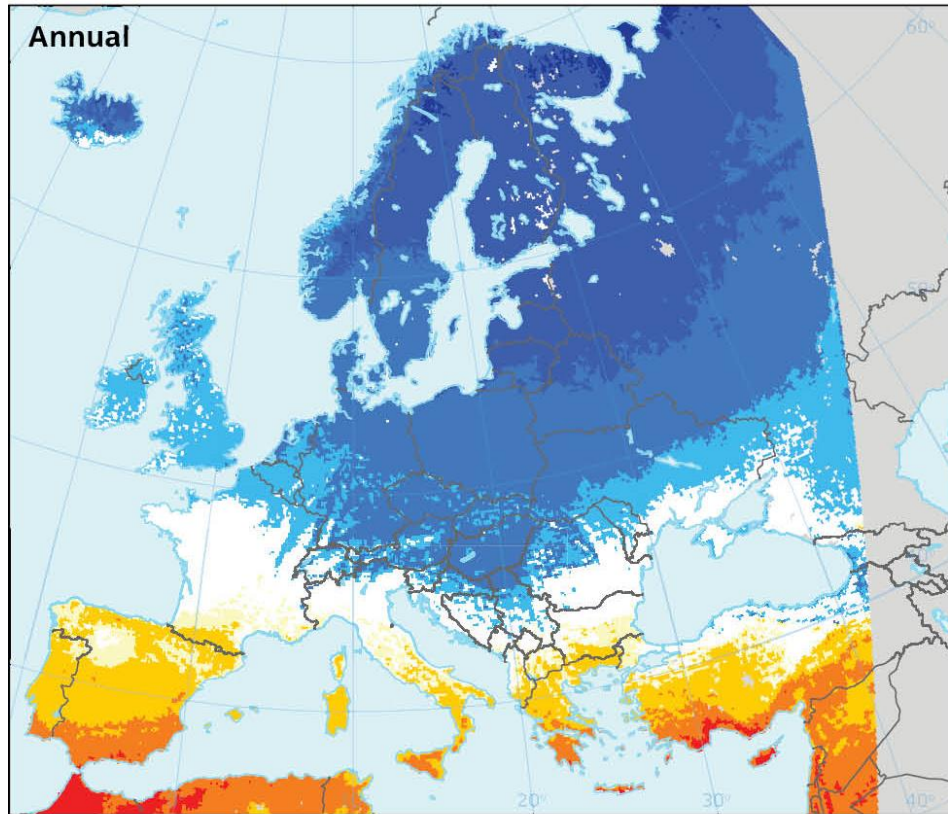


NBS in urban environment



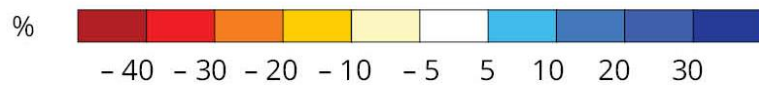
Detailed guidance on evaluation frameworks

Projected precipitation change for 2080s (RCP 8.5 high emission scenario)



Source: EURO-CORDEX
(Jacob et al., 2014)

Projected change in annual (left) and summer (right) precipitation



Outside coverage



Climate change impacts on agriculture

Mediterranean region

- Large increase in heat extremes
- Decrease in precipitation
- Increasing risk of droughts
- Increasing risk of biodiversity loss
- Increasing water demand for agriculture
- Decrease in crop yields
- Increasing risks for livestock production
- Agriculture negatively affected by spillover effects of climate change from outside Europe

Coastal zones

- Sea level rise
- Intrusion of saltwater

Boreal region

- Increase in heavy precipitation events
- Increase in precipitation
- Increasing damage risk from winter storms
- Increase in crop yields

Atlantic region

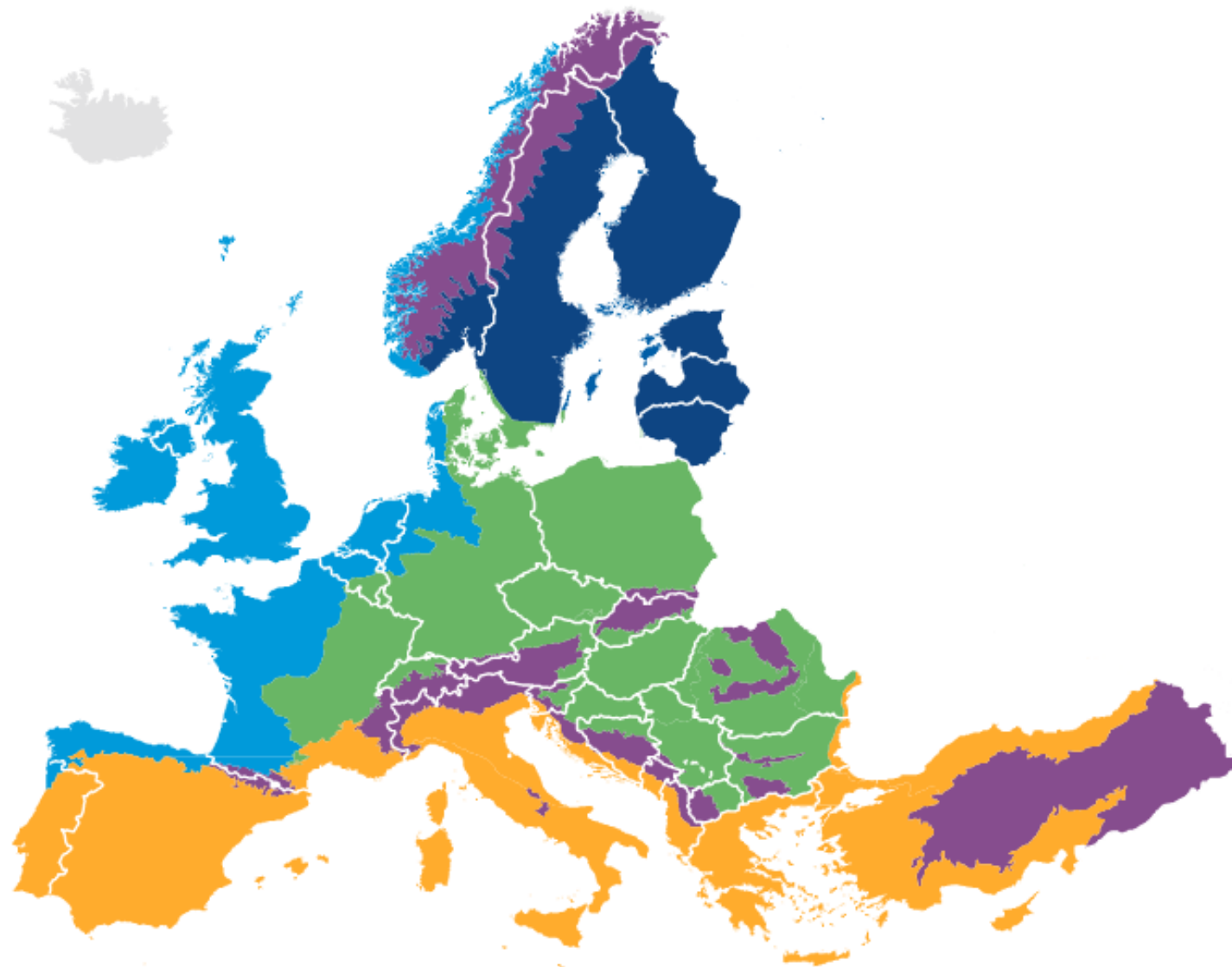
- Increase in heavy precipitation events
- Increasing risk of river and coastal flooding
- Increasing damage risk from winter storms

Continental region

- Increase in heat extremes
- Decrease in summer precipitation
- Increasing risk of river floods

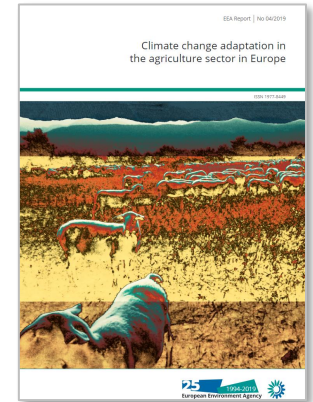
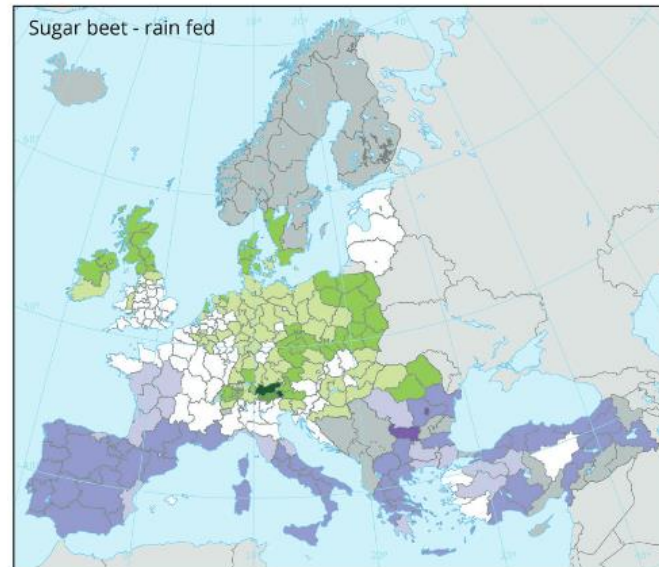
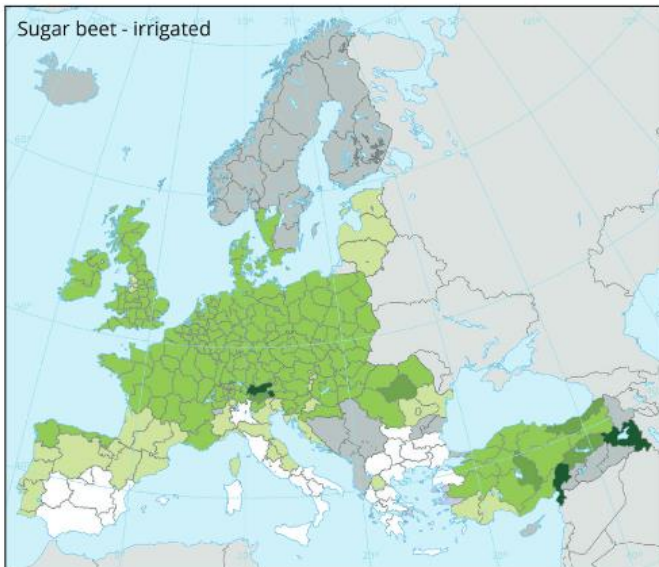
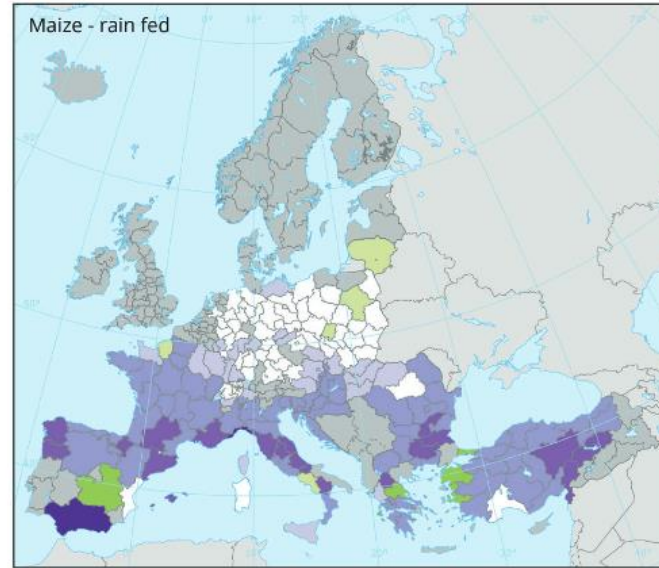
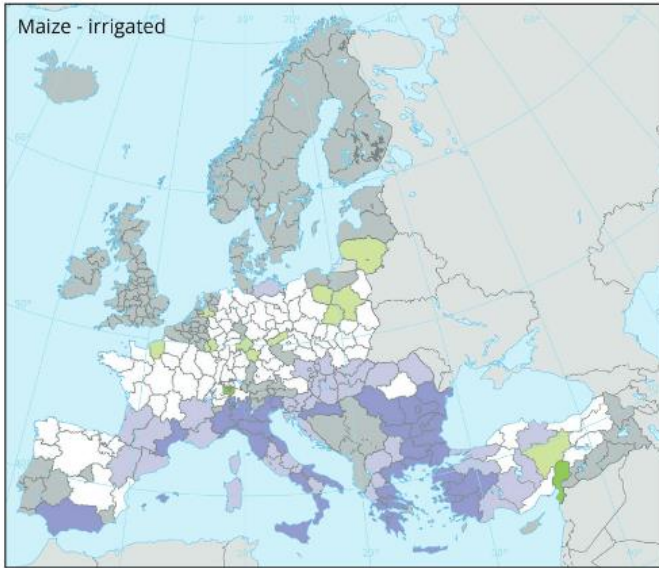
Mountain regions

- Temperature rise larger than European average
- Upward shift of plant and animal species
- Risk of hail
- Risk of frost
- Increasing risk from rock falls and landslides

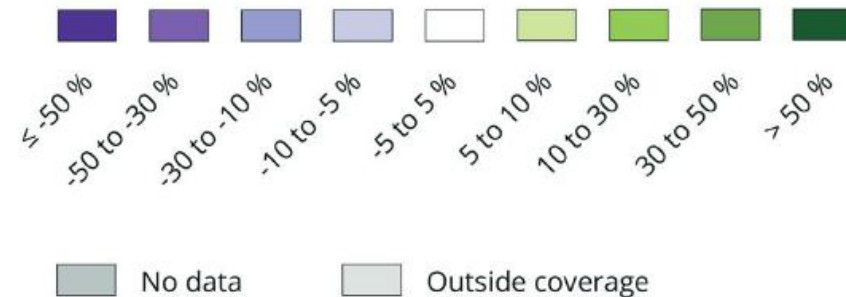


Source: EEA 2019

Climate change impacts on yields (high emission scenario RCP8.5)

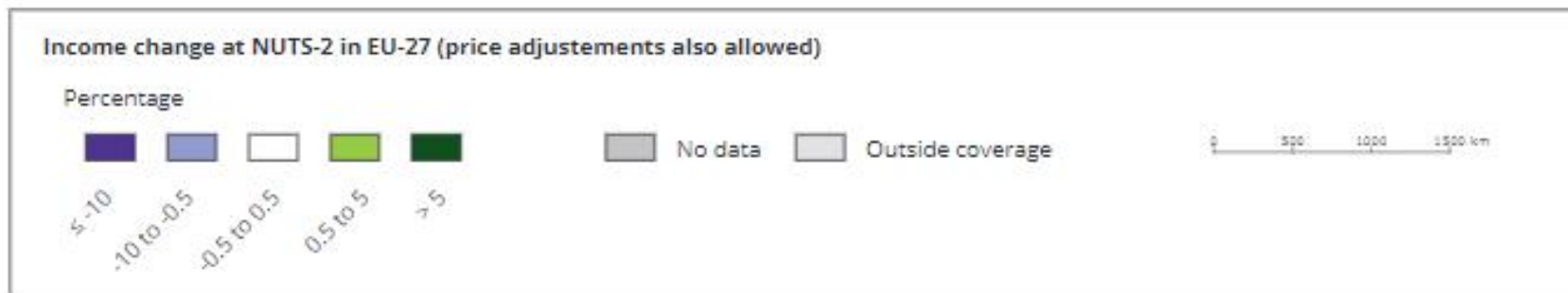
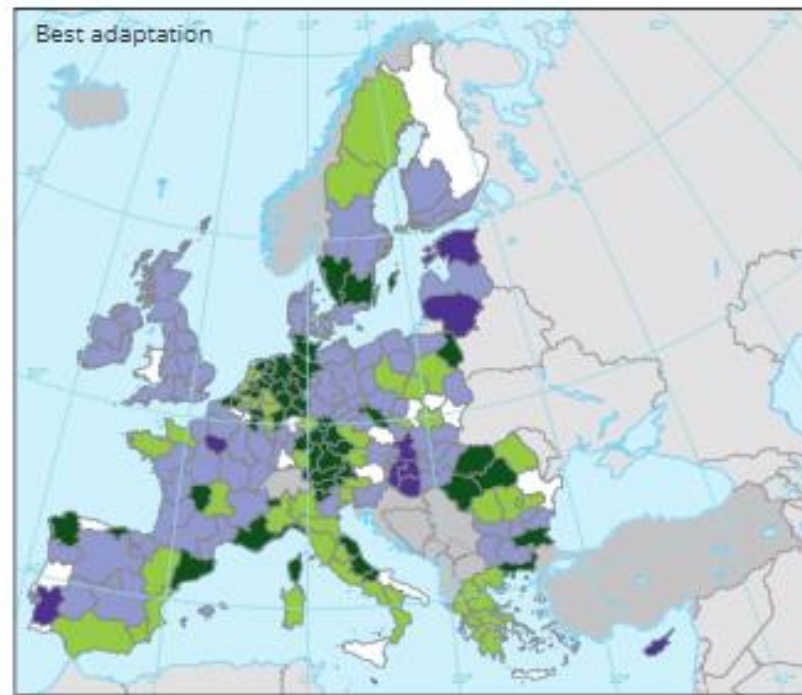
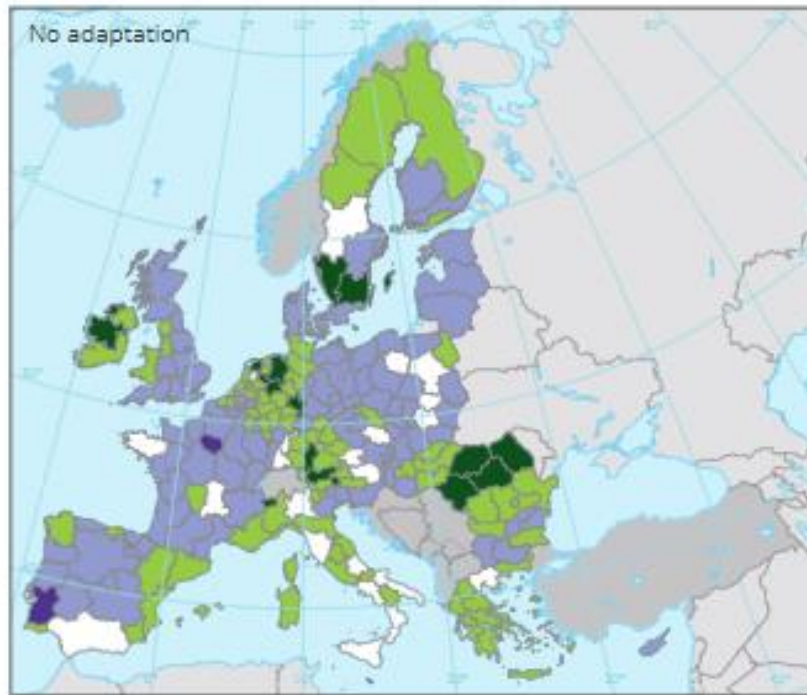


Changes in irrigated (left) and rain-fed (right) yields in the period 2021-2050 compared to 1981-2010



Source: Joint Research Centre based on Ciscar et al. (2018).

Climate change impacts on income (mid2020s compared to 2004)



Source: EEA 2019

Source: Adapted from Shrestha et al. (2013).

Nature Based Solutions

Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience.

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.

(EC definition)



NBS in global policies

Global policy	NbS-related terms							Reference to DRR	Reference to CCA	Level of support
	NbS	EA/EbAp	GI/BGI	EbA	SM/EBM/SFM	NWRM	Eco-DRR			
SFDRR 2015-2030		✓		✓			✓	✓	✓	Strong explicit
SDGs					✓			✓	✓	Medium
UNFCCC ^(a)	✓		✓	✓	✓	✓	✓	✓	✓	Strong explicit
CBD ^(a)	✓	✓	✓	✓	✓	✓	✓	✓	✓	Strong explicit
UNCCD ^(a)	✓			✓	✓		✓	✓	✓	Medium
New urban agenda	✓ ^(b)	✓	✓	✓	✓			✓	✓	Strong explicit
Ramsar Convention ^(a)		✓		✓	✓		✓	✓	✓	Medium

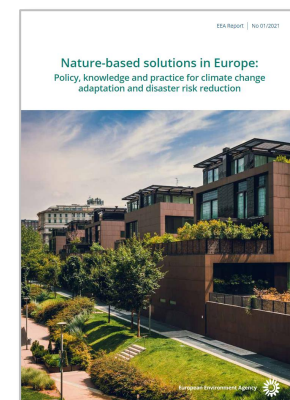
Note: ^(a) The original agreements/treaties, as well as relevant subsequent conclusions, resolutions and decisions, were reviewed.
^(b) Uses the term 'nature-based innovation'.



Source: EEA 2021

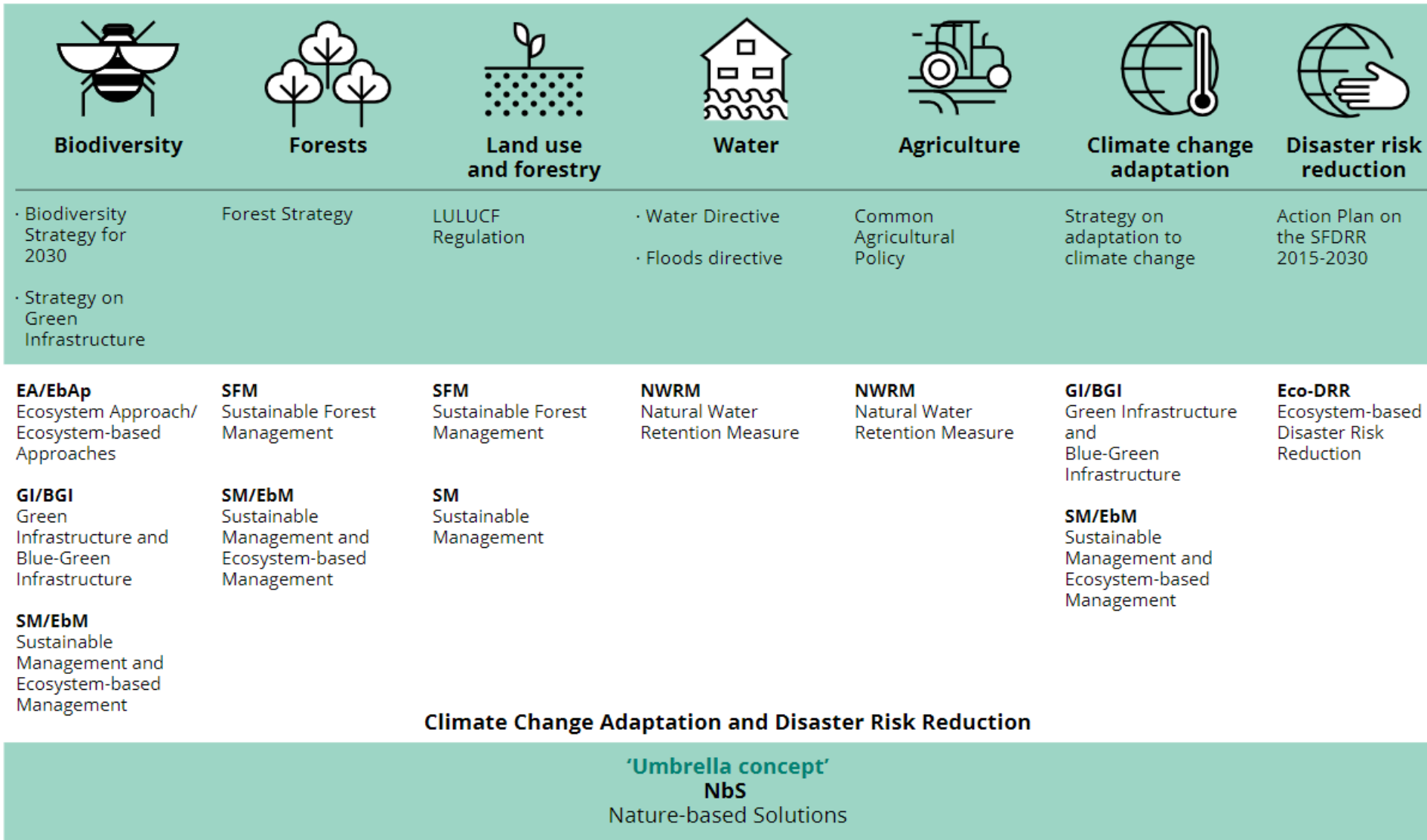
NBS in EU policies

EU policy	NbS-related terms							Reference to DRR	Reference to CCA	Level of support
	NbS	EA/EbAp	GI/BGI	EbA	SM/EbM/SFM	NWRM	Eco-DRR			
European Green Deal	✓							✓	✓	Strong explicit
Bioeconomy strategy (update)	✓	✓	✓		✓				✓	Medium
Biodiversity strategy for 2030	✓		✓		✓			✓	✓	Strong explicit
Green infrastructure strategy	✓	✓	✓	✓			✓	✓	✓	Strong explicit
Forest Strategy			✓		✓				✓	Medium
LULUCF Regulation					✓			✓	✓	Medium
Action plan on the Sendai Framework	✓	✓	✓	✓	✓	✓	✓	✓	✓	Strong explicit
Adaptation strategy	✓		✓		✓			✓	✓	Strong explicit
Floods Directive					✓	✓		✓	✓	Strong implicit



Source: EEA 2021

NBS in EU policies and across sectors



Source: EEA 2021

Nature-based solutions to key climate hazards

Key climate hazards



Water management

Water scarcity and water quality deterioration due to **droughts**

Floods and landslides due to **heavy precipitation**



Forests and forestry

Limiting tree growth, increasing tree mortality and risk of pest outbreaks due to **droughts** and **forest fires**

Landslides and **soil loss** due extreme rainfall events



Agriculture

Crop and livestock loss due to **heat stress**, increased risk to **pest and disease outbreak**, and water scarcity

Damage to yield, transportation and asset loss due to **flooding**



Urban areas

Heat stress due to **heatwaves**

Urban flooding due to **heavy precipitation**



Coastal areas

Loss of land due to **rising sea level** and **coastal erosion**

Loss of life due to **storm surges** and **inundation**

NbS options

Large-scale measures, e.g. river, floodplain restoration

Small-scale measures, e.g. urban rainwater harvesting

Protection of intact forest

Restoration of degraded forests

Sustainable forest management, e.g. tree diversification, selective logging

Improved soil and water farm management

Crop type diversification and rotation

Agroforestry

Parks, urban forest, street trees

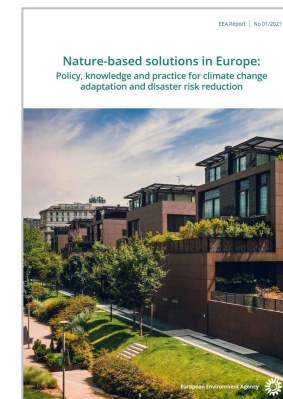
Green buildings, e.g. green roofs and walls

NbS for water management, e.g. bioswales, detention ponds

Rehabilitation and restoration of coastal habitats

Near-shore enhancement of coastal morphology

Hybrid solutions



Source: EEA 2021



Key points

- NBS is an umbrella concept
- Increasingly adopted in EU and global policy frameworks
- Applied at multiple scales and across multiple sectors
- Multifunctionality and stakeholder involvement are key
- Dedicated evaluation frameworks needed
- Overarching strategic planning and evaluation need attention

Current focus of EEA work:

- *Applied evaluation frameworks and upscaling potential*



Thank you!

