It‘s time to act locally on our Alpine soils

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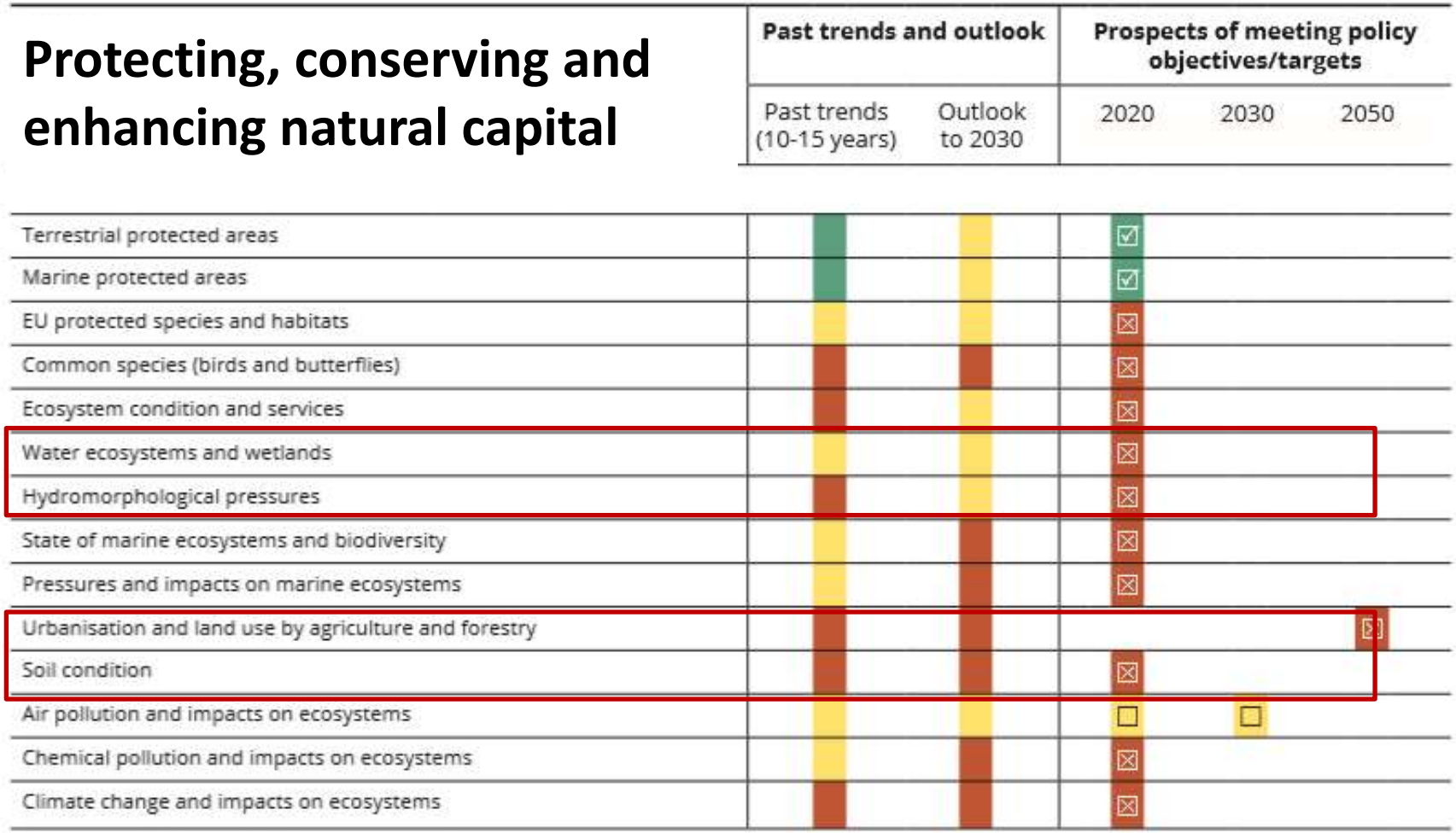
Outline

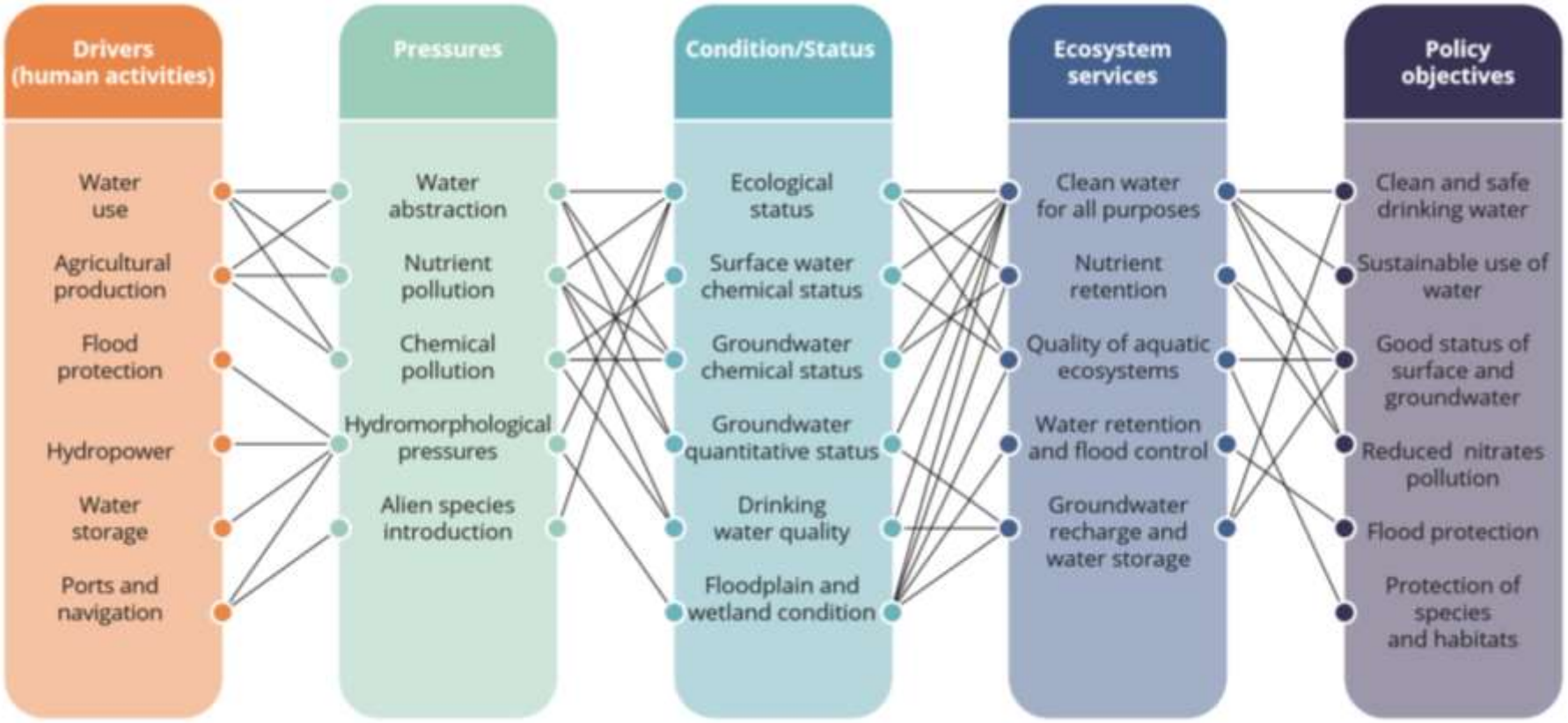
- Trends and outlooks regarding natural capital
- Land and soil
- Peatlands
- Water
- EU level, state level and local solutions

Past trends and outlooks regarding natural capital



European Environment Agency, 2019

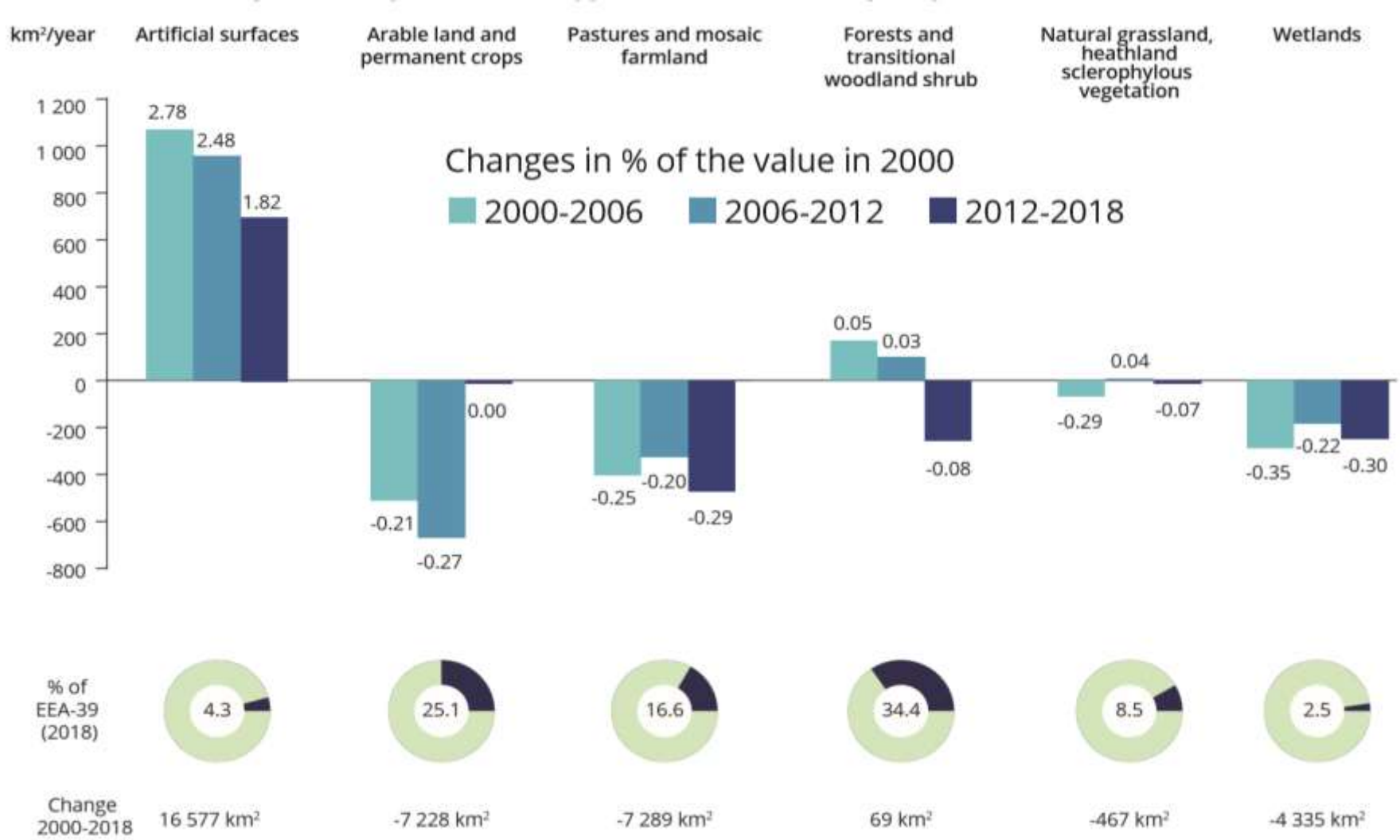
Links between drivers, pressures, condition, ecosystem services and policy objectives



Land and soil

Ecosystem services related to land use are critical for economy and quality of life. Competition for land and intensive land use affects the condition of soils and ecosystems, altering their capacity to provide these services. It also reduces landscape and species diversity.

Change in land cover types in the EEA-39 (2000-18)



Land and soil status

- Land take and soil sealing continues, mostly at the expense of agricultural areas
- The rate of reuse of developed land remains low (land recycling only 13 % of urban developments in the EU)
- Landscape fragmentation has increased, impacting uninhabited or dispersed rural areas and suburbs — areas with relatively greater potential to supply ecosystem services.
- Soil degradation (physical, chemical, biological) is widespread and diverse, but not well monitored, and often hidden.
- There is increasing evidence that land and soil degradation have major economic consequences, whereas the cost of preventing damage is significantly lower.

Solutions – how to achieve land degradation neutrality?

- Binding targets, incentives and measures are largely missing at the EU level – e.g. there is no legal framework or incentive to recycle urban land.
- Investments in land recycling, as well as halting land take (densification, constructing on already used sites - grey recycling, converting developed land into green areas -green recycling).
- Setting up green infrastructure to re-establishing and maintaining unsealed areas
- Examples of good practices - Measures to halt land take vary considerably throughout European countries. The target to achieve 'zero net land take by 2050' is integrated into national policies in France and Switzerland. In Germany, the national sustainable development strategy sets a goal to limit the use of new areas for settlement and transport).

Soil resources can not be protected based on the existing strategies

- Need for binding policy targets: e.g. to build and publish registers of polluted sites or to assess and apply harmonised definitions and critical thresholds for contaminants in soils.
- Need to adress threats to soil — compaction, salinisation and soil sealing in European legislation.
- A revision of the existing soil thematic strategy (EC, 2006) is urgently needed, also Europe-wide harmonised soil monitoring and indicator assessments.
- Technical solutions already known to practitioners still need criteria, thresholds and incentives to make its application on the ground part of everyday practice.
- Societal discussion on soil protection needs to expand beyond economics and include the concept of land stewardship - this would complement the production oriented and biophysical aspects of land management
- Better land stewardship must focus on ecosystem services. However, the services that landowners may supply as an obligation to the common good (land and soil) will need clear specifications.
- **The more systemic land systems approach** may provide a holistic frame, but it needs to be complemented with relevant governance or legal measures.

Climate change mitigation

Competition for land and space
for renewable energy equipment,
negative emissions?

Limiting warming to 1.5°C requires rapid and unprecedented transitions in energy, land use, urban and infrastructure systems

For example: renewables supply 70-85% of electricity in 2050

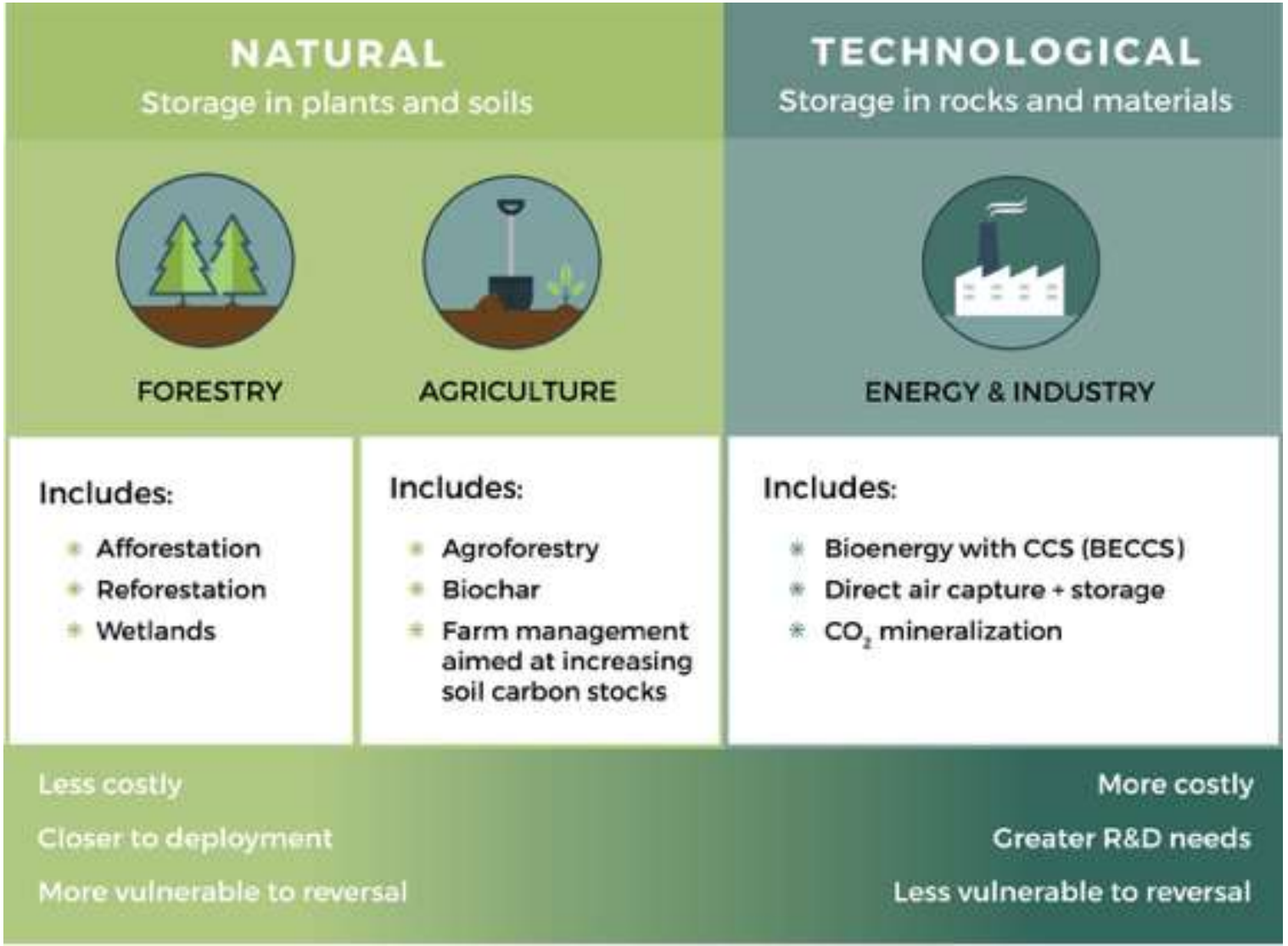
Renewables are diffuse - (too) small power per unit area

Power per unit land area	
Wind	2 W/m^2
Offshore wind	3 W/m^2
Tidal pools	3 W/m^2
Tidal stream	8 W/m^2
Solar PV panels	5–20 W/m^2
Plants	0.5 W/m^2
Solar chimney (Spain)	0.1 W/m^2
Concentrating solar power (desert)	15–20 W/m^2
Ocean thermal	5 W/m^2
Rain-water (highlands)	0.24 W/m^2
Rain-water (lowlands)	0.02 W/m^2
Nuclear (fission)	1000 W/m^2

How could ‘negative emissions’ affect land, food and wildlife?

- Negative emissions are a group of methods that aim to remove CO_2 from the atmosphere and store it in the land or ocean: from planting trees – to the technologically advanced, such as using machines to suck CO_2 from the air
- If pursued at scale, most of **these techniques would require varying amounts of land** – potentially reducing the land left for wildlife and food production.

Carbon removal techniques might require huge amounts of land



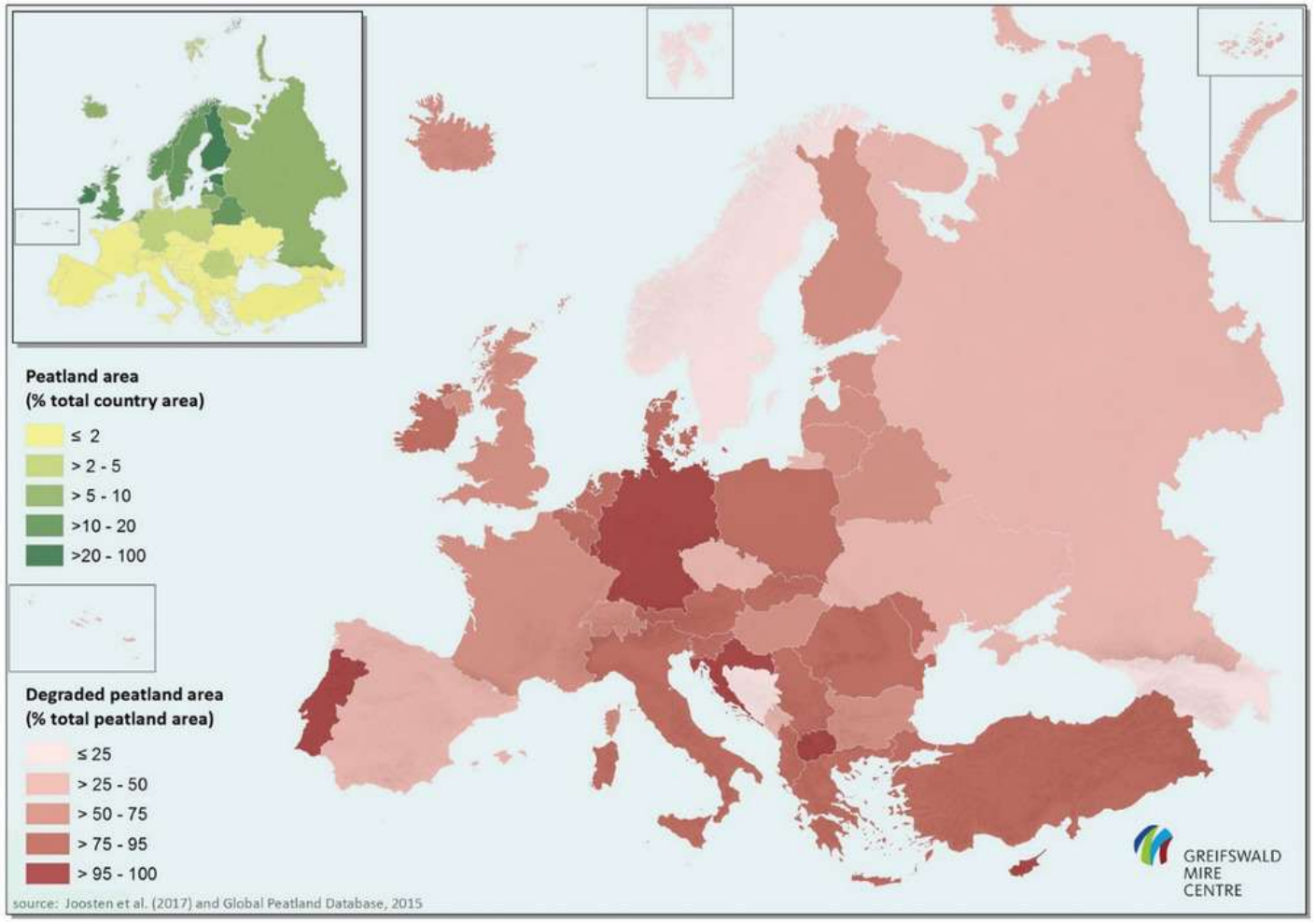
Peatlands

Peatlands help to improve water quality, provide habitat for rare and threatened biodiversity, and can still be used for production of biomass. Wet peatlands do not release CO_2, can potentially sequester carbon and can contribute as nature-based solutions to the achievement of the European Green Deal and to the EU Biodiversity Strategy 2030.

Challenging environment

- Climate Change – peatlands play an important role as carbon store, and are a significant source and sink of GHG
- Peatland restoration increasingly popular, UN Decade of Restoration
- Post-2020 Global Biodiversity Framework
- Peatland conservation and restoration cuts across most United Nations Sustainable Development Goals
- Wisely adjusted land use on peatlands can substantially contribute to low-emission goals and further benefits for farmers, the economy, society, and the environment.

Degraded peatland area



Peatland rewetting can provide win-win-options for:

REVIEW

ADVANCED SUSTAINABLE SYSTEMS

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The Power of Nature-Based Solutions: How Peatlands Can Help Us to Achieve Key EU Sustainability Objectives

Franziska Tanneberger, Leo Appulo, Stefan Ewert, Sebastian Lakner, Niall Ó Brolcháin, Jan Peters, and Wendelin Wichtmann*

Peatlands are lands with a peat layer at the surface, containing a large proportion of organic carbon. Such lands cover >1 000 000 km² in Europe, which is almost 10% of the total surface area. In many countries, peatlands have been artificially drained over centuries, leading to not only enormous emissions of CO_2, but also soil subsidence, mobilization of nutrients, higher flood risks, and loss of biodiversity. These problems can largely be solved by stopping drainage and rewetting the land. Wet peatlands do not release CO_2, can potentially sequester carbon, help to improve water quality, provide habitat for rare and threatened biodiversity, and can still be used for production of biomass ("paludiculture"). Wisely adjusted land use on peatlands can substantially contribute to low-emission goals and further benefits for farmers, the economy, society, and the environment.

1. Introduction

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- Agriculture: Alternative income streams on marginal organic soils, soil protection, better social image, climate adaptation (floods or droughts);
- Society: additional employment in rural areas, regional recreation and tourism, identity, reduction of damage caused by drainage;
- Economy: Substitution of fossil resources (energy, construction material, peat in horticulture) by renewable biomass materials from wet peatlands, bioeconomy, sustainable food, and fodder production;
- Environment: Support of wide-ranging ecosystem services (climate, water, biodiversity)

Peatland conservation and restoration

Legally binding proposals (Wetlands International-European Association)

- Local comunities and states need to take clear responsibility and commitment to restore, safeguard peatlands.
- Landowners and -users should be encouraged and incentivised to maintain and re-establish high water levels in peatlands to maximise carbon storage, minimise GHG emissions, support biodiversity.
- Deliberate degradation of the long-term carbon storage capacity of peatlands should be penalised
- Investment plan in the frame of the EU Green Deal for a just transition should establish compensation and economic diversification funding to mitigate the socio-economic impacts of land use changes

Local solutions for peatland conservation and restoration

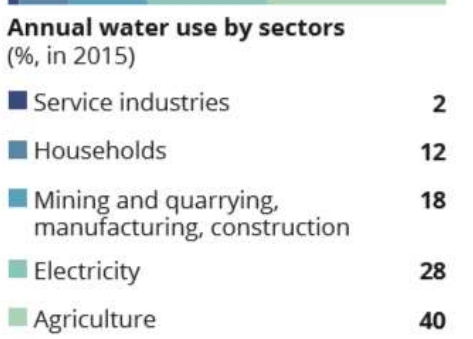
- Establishing long-term programs (>10years) to ensure planning security and permanence of positive climate and environmental effects
- Applying and refining existing instruments (e.g., European Agricultural Fund for Rural Development and European Regional Development Fund) to provide incentives for all implementation steps, including site preparation, establishment of suitable crops and techniques, raising the water level, selection and breeding, management and harvest with adapted agricultural equipment, processing, and marketing;
- Promoting knowledge transfer, consultation, and establishment of demonstration farms;
- Exchanging on experience between peatland-rich regions in Europe to develop regionally customized solutions, including participation and acceptance of all stakeholders, output orientation, and cost efficiency

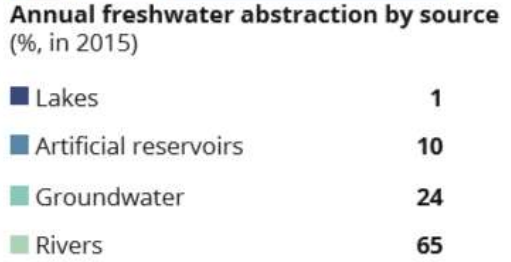
WATER

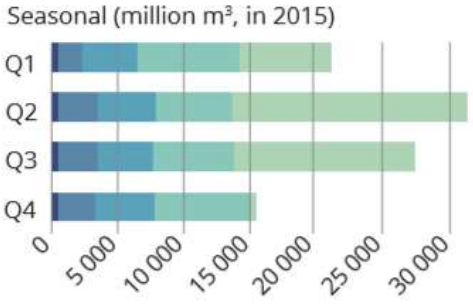
Securing sustainable use of water is a key challenge globally, within Europe and regionaly.

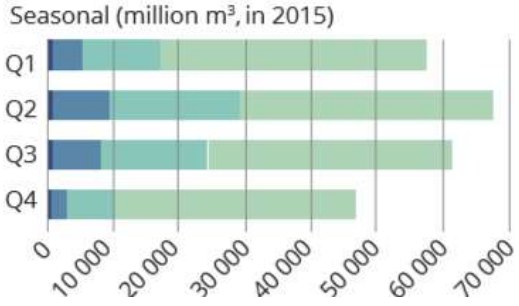
Water use in Europe by economic sector and by source

Around 243 000 million m^3 of water per year are abstracted for different sectors.
Around 60 % of the water abstracted is returned to the environment, but it has often been polluted in the process.









Water problem: balancing societal demands for water with ensuring its availability for nature.

- Only 40 % of Europe's surface water bodies achieve good ecological status and wetlands are widely degraded, as are 80-90 % of floodplains. This has a critical impact on the conservation status of wetland habitats and the species that depend on them.
- Freshwaters continue to be affected by diffuse pollution, hydromorphological changes and water abstraction.
- Climate change is likely to change the amount of water available regionally, increasing the need for either flood protection or drought management.

Solutions for water management

- Improved implementation and increased coherence between EU water-related policy objectives and measures is needed to improve water quality and quantity.
- Looking ahead it will also become increasingly critical to address and monitor the climate-water-ecosystem-agriculture nexus and connection with energy needs.

Local solutions for water management

It is on the river basin scale that effective solutions for can be found and essential knowledge is being developed.

- natural water retention measures
- buffer strips
- smart water pricing
- more efficient irrigation techniques and
- precision agriculture

Ecosystem-based management approach, considering multiple environmental objectives and co-benefits to society and the economy

Local solutions to hydromorphological pressures

- River restoration projects reconnecting rivers and floodplains
- Structural changes to the river and floodplain
- Managing how land is used within the floodplain
- Removal of (some) barriers that disrupt the river ecosystem and/or make barriers passable for fish

Conclusions: from ambition to action

- The extent of the environmental and climate crisis is clear.
- Develop knowledge and skills fit for the 21st century — focusing on understanding the key systems driving sustainability
- Linking knowledge with action
- Realise the unfulfilled potential of existing environmental policies — by achieving full implementation across Europe through increased funding, capacity building, stakeholder engagement and better coordination of local, regional and national authorities
- Develop systemic policy frameworks with binding targets — to mobilise and guide actions across society
- Reorient public budgets, private investments and financial markets towards promoting sustainability
- Develop and adopt metrics for measuring society's progress towards sustainability that go beyond GDP.