Interreg North Sea

Co-funded by the European Union

Blue Transition

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Strategies for climate resilient water regions

Why we need a Blue Transition

Climate change is increasingly affecting the foundations of regional development: water availability, soil quality, food production and biodiversity. Groundwater systems in particular are under pressure. Changes in precipitation patterns, longer dry periods and more frequent extreme weather events disrupt natural recharge processes. In the North Sea region, this is already leading to a declining availability of groundwater, deteriorating water quality and increasing risks of salinisation.

At the same time, climate change is also responsible for altering growing seasons and intensifying drought stress, placing pressure on agriculture, and threatening food security and rural livelihoods. Nature reserves, essential for biodiversity and ecosystem services, are equally vulnerable. Rising temperatures, changing rainfall regimes and cumulative land-use pressures contribute to habitat degradation and fragmentation.

The change in landuse, urbanisation and agricultural intensification often amplify these impacts. Without coordinated action, pressures on groundwater, soils and ecosystems will continue to increase. Climate resilience, therefore, requires integrated approaches to water, soil and land-use management.

The Interreg North Sea project Blue Transition addresses these challenges by developing strategies for integrated water and soil management that support adaptation to climate change. The consortium's shared objective is to secure sufficient quantities of good-quality groundwater, revitalise natural habitats and contribute to climate mitigation through reduced CO_2 emissions.

Building blocks of a Blue Transition strategy

Strategies for climate resilient groundwater and soil management in regions must be local. Local properties of soils, groundwater, ecology as well as water use, stakeholders and governance shape the measures which increase the resilience of our society. There are no generic solutions.

Through the Blue Transition project, similarities between pilots enabled to identify general, overarching aims to be considered for every local strategy:

- change land-use
- increase soil health
- diversify water sources and optimize their use

Specific measures to reach these aims are then guided by:

- Knowledge of the subsoil and water system is crucial to be able to predict the impact of climate change and to select effective measures.
- Understanding human use and activities is essential to understand changes in the local system functioning and to develop effective measures.
- Water balance is a central element to look at when designing effective measures.
- Effective measures must take into account that landscapes are connected by water.

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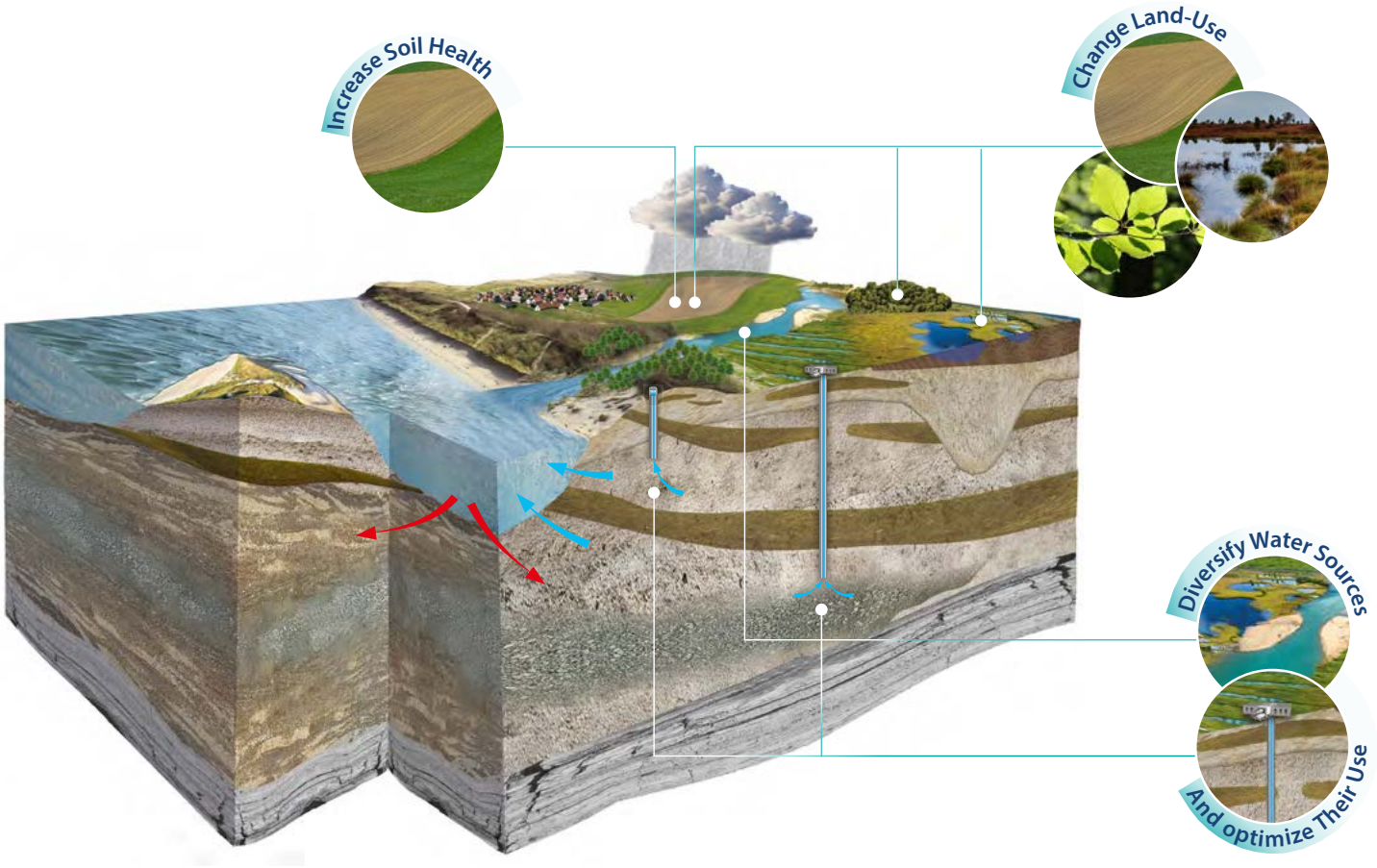

Success stories

Diversifying water sources and optimising use

Improved system understanding can open new perspectives for sustainable water management. On Endelave (Denmark), geophysical investigations identified areas that require long-term protection and revealed a deep aquifer that may serve as an alternative source of drinking water.
In the Uelzen region (Germany), scientific simulations supported joint optimisation of groundwater abstraction from hundreds of wells, balancing irrigation needs with ecosystem protection.
In the Vomb Trough (Sweden), knowledge of subsurface processes in infiltration ponds is now guiding more effective future redesigns.

Changing land use

In the Meirdam area (Belgium), water level agreements and the installation of weirs enabled the initial rewetting of wetlands. These measures now serve as a reference for further upscaling and funding within the Wetlands4Cities initiative.
In the Drentsche Aa and Veenkoloniën areas (Netherlands), collaboration between farmers and Blue Transition partners led to testing alternative land-use practices and crops. This strengthened local understanding of system dynamics and improved opportunities for climate adaptation and groundwater protection.

Improving soil health

In Germany, long-term modelling of nitrogen and carbon dynamics demonstrated that relatively modest changes in soil management can increase humus content and improve soil water retention. The results underline the importance of sustained, long-term adjustments rather than short-term interventions.

Strategic challenges and recommendation

Throughout the process of measure implementation and strategy development, the Blue Transition pilots also revealed shared challenges that require attention at policy level.

- System understanding is still dominated by natural sciences. To support balanced decision-making, economic and social impacts must be integrated more systematically, enabling a science-based dialogue between sectors and interests.
- Short-term technical measures can often be implemented relatively quickly (less drainage for peatlands, more effective irrigation or other technical solutions). In contrast, systemic change in land use and water management is constrained by legislation, economic conditions, spatial limitations and sometimes conflicting regulations. Long-term transitions therefore require clear political direction at local and regional level.
- While local measures can be designed through improved system understanding, conflicts of interest remain. Stakeholder participation helps but is not sufficient on its own. Climate resilience depends on shared objectives that are reinforced by clear and consistent targets at regional, national and European level.

About the Blue Transition group

The Blue Transition group worked on integrated water and soil management in 16 pilot areas across Denmark, The Netherlands, Sweden, Belgium, France and Germany. The pilots addressed complex interdependencies between water, soil, land use and governance, developing locally tailored strategies through close transnational cooperation.

Close transnational exchange between 23 project partners and a wide range of stakeholders contributed to this process. Together, they developed local strategies that support a systemic change, incorporate nature-based solutions and propose measures to strengthen the foundations for climate-resilient blue regions across the North Sea area.

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