



# DESIGNING CLIMATE RESILIENT LANDSCAPES

STATE OF THE ART  
PROJECTS IN EUROPE

Conference on Designing Climate  
Resilient Landscapes  
Hosted by the Czech Presidency  
of the Council of the EU  
Prague, 13–14 September 2022

# DESIGNING CLIMATE RESILIENT LANDSCAPES

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Anna Hubáčková  
Minister of the Environment

Dear readers,

You are holding in your hands a publication that brings together some of the best practice-oriented projects currently being implemented in Europe in the field of climate change adaptation. As you will see, they cover a range of measures from water retention in the landscape, soil restoration, increasing forest resilience, and restoring ecosystem services.

The one common thread in all the measures is that they are not technical or engineering solutions, but harness the creative power of natural processes to bring about the necessary change. A second such linchpin, perhaps even more important, is that adaptation to climate change and the measures that reduce our contribution to climate change are one continuous vessel. Therefore, it is not possible to separate efforts to make our landscapes or cities more resilient to the impacts of climate change from how we need to transform our energy and fuel consumption so that we do not contribute further to global temperature increases.

This is the main idea that the Czech Presidency of the European Union wants to emphasize and underline.

The Russian aggression in Ukraine brings to the fore the energy crisis and shows how interlinked these crises are: we cannot solve the energy crisis without solving the climate crisis. Only an end to the use of fossil fuels will help us in the long term. It will reduce the amount of greenhouse gases we pump into the atmosphere, while reducing our dependence on fuel imports from non-democratic countries.

Climate change adaptation and nature and landscape protection are also interlinked. A resilient and healthy landscape offers a safe haven for both animals and plants, while coping with negative impacts of climate change. Protecting ecosystems and biodiversity is therefore an essential prerequisite for mitigating the impacts of climate change across Europe. Only healthy soil can be resilient and of sufficient quality for farmers, and healthy forests and landscapes can retain water and withstand prolonged drought.

One of big tasks of the Czech Presidency is to find an agreement on a transformative Global Biodiversity Framework post-2020. The Czech Republic will lead the European Union in pushing for ambitious measures, from strong targets for protecting our land and oceans to a framework for monitoring and reviewing implementation.



By mid-century, Europe shall become a continent that is not only climate neutral, but also climate resilient. The new EU Strategy on Adaptation to Climate Change and national adaptation strategies of EU Member States have paved the way to achieving the latter objective. Since 'all theory is grey but forever green is the tree of life', strategies and action plans can be put in practice only by passionate people: through transformative ideas, experience sharing, and involvement of relevant stakeholders. The recent report of the Inter-governmental Panel on Climate Change emphasized the urgency of immediate and more ambitious action to address the impacts of climate change, including in Europe. Designing and managing resilient landscapes – while using nature-based solutions and involving the public – is a necessary pathway to climate resilient development as well as to the recovery of vital ecosystem services, such as clean water, clean air, biodiversity, or a welcoming environment for tourism.

### The Designing Climate Resilient Landscapes conference aims at

- enabling experts to share their best practices, successful pilot projects, and methodologies on the adaptation of landscapes to climate change in general, and on water retention on the whole surface of the EU territory, soil regeneration, forest resilience, and ecosystems services recovery in particular,
- raising interest of decision-makers and involve the public in designing and managing resilient landscapes, • fostering discussion on relevant submitted and planned elements of EU legal framework (nature restoration law, soil legal framework, forest strategy, etc.), and
- helping align the position of EU Member States on climate change adaptation issues prior to COP27, in order to take informed, well-targeted, and timely action.

Participants of the conference shall also discuss and approve the 'Prague Appeal', which will be then presented to the Environmental Council in October 2022.

While you listen to the speakers and you browse through this brochure, you may like to reflect on what are the elements which resonate across the whole agenda of the conference, and which should be therefore addressed in the Prague appeal.



### 9:00 Welcome

Moderated by **Ladislav Miko**  
Ministry of the Environment, Czechia

**Anna Hubáčková**  
Minister of the Environment, Czechia  
**Zdeněk Nekula**  
Minister of Agriculture, Czechia  
**Leona Gergelová Šteigrová**  
Deputy Minister for Regional Development, Czechia

### 9:15 Keynote addresses

Moderated by **Michal Nekvasil**  
Czech EU Presidency

**Hans-Otto Pörtner**  
Co-Chair of Working Group II. of the IPCC  
**Hans Bruyninckx**  
Executive Director at the European Environment Agency  
**Clara de la Torre**  
Acting Director General, DG Climate Action, European Commission

### 11:00 Section 1 – Soil

Moderated by **Ladislav Miko**  
Ministry of the Environment, Czechia

**Claudia Olazábal**  
Directorate-General Environment, European Commission  
**Wim van der Putten**  
Netherlands Institute of Ecology  
**Luca Montanarella**  
Joint Research Centre, European Commission  
**Katarina Hedlund**  
Lund University  
**Martin Smetana**  
Nadace Partnerství

### 12:00 Section 2 – Water

Moderated by **Michal Nekvasil**  
Czech EU Presidency

**Willem Jan Goossen**  
Directorate-General Climate Action, European Commission  
**Jane Madgwick**  
Wetlands International  
**Iva Bufková**  
National Park Šumava  
**Ernst Überreiter**  
Austrian Federal Ministry of Agriculture, Forestry, Regions and Water Management  
**Paul Chatterton**  
Project WaterLANDS

### 14:00 Section 3 – Forests

Moderated by **Miroslav Svoboda**  
Czech University of Life Sciences

**Peter Löffler**  
Directorate-General Climate Action, European Commission  
**Bart Muys**  
KU Leuven  
**Patrick Worms** – World Agroforestry  
**Alexander Horst** – European Investment Bank  
**Tomáš Vrška** – Pro Silva Europe

### 15:00 Section 4 – Presentation of innovative adaptation projects

Moderated by **Michal Nekvasil**  
Czech EU Presidency

16:00 Conference address by Saher Rashid Baig, Children and Youth Constituency to the UNFCCC

16:30 Presentation and approval of the "Prague Appeal" and conclusions and recommendations to the Czech EU Presidency

16:55 Closing remarks by Anna Hubáčková, Minister of the Environment, Czechia

17:00 Individual discussion with project implementers and facilitators

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*Placeholder for the Prague Appeal*

*Placeholder for the Prague Appeal*



## Content

FUNDACION GLOBAL NATURE .....	10
REWILDING EUROPE .....	12
BRATISLAVSKÉ REGIONÁLNE OCHRANÁRSKE ZDRUŽENIE - BROZ .....	14
GEOGRAPHICAL ARBORETUM OF TERVUREN .....	16
NATIONAL PARK ŠUMAVA .....	18
ŠLP KŘTINY .....	20
ŽIVÁ KRAJINA .....	22
HNUTÍ DUHA .....	24
FARMA BLATNIČKA .....	26
COMPREHENSIVE LANDSCAPE PLANNING .....	28
EU MISSION: ADAPTATION TO CLIMATE CHANGE .....	30
EU MISSION: A SOIL DEAL FOR EUROPE .....	32
STÁTNÍ POZEMKOVÝ ÚŘAD .....	34
WWF SLOVAKIA .....	36
WWF HUNGARY FOUNDATION AND PARTNERS .....	38
INTERSUCHO .....	40
MERLIN PROJECT .....	42
SONIAN FOREST .....	44
WATERLANDS .....	46

**LIFE Soria ForestAdapt** is one of the projects approved by the European Commission for the implementation of LIFE climate change action programs. The project has a total budget of 1,595,745 euros and an implementation period of three years (11/2020-01/2024).

The LIFE Soria ForestAdapt project aims to increase the resilience of southern European forests to climate change by including adaptive measures in public and private forest management plans.

The province of Soria has been an example of forest management since the Middle Ages. Through the LIFE project, forest management plans will be created that will serve as a technical reference, including measures to adapt to climate change. These measures could be extended to the whole region and even to the whole country.

The project covers more than 200,000 hectares of public forest and will also have an impact on afforestation programs on private land, especially agricultural land.

The aim is to extend the model to the Region of Castilla y León, and to the rest of Spain and southern Europe.



**Studying the past and future of the climate and its risks and "listening" to the trees to create a tool to help foresters and private landowners.**

The risks and damages that climate change can produce have been identified and different adaptation proposals have been made for the different resources (hydrology, mycology, resin production, pine nuts, pastures, etc.).

To improve the resilience of the forests, all significant tree species have been investigated and comparisons with the climatic past have been made to predict the future behaviour of the forests.

With this information, a tool is being developed that will be used to select the best adapted species to improve the resilience of the forests according to the characteristics and location where the actions are planned. This tool will be available to all foresters and forest owners to assist forest management. It will be available for the whole of Spain and may also be available for Europe.



**Detection of other risks – and how companies can help**

One of the objectives of the project is to implement the proposed measures over as wide an area as possible. During the development of the project, other risks have been detected, such as the lack of forest management due to rural abandonment.

Most of the forest area in Soria, and in Spain, is private and in communal hands, in many cases without a consolidated management body.

We are currently supporting initiatives that encourage the creation of management entities and we are also creating solutions for companies to encourage environmental investment.

Companies have an important role to play in preserving the environment and we are creating different offers in which they can invest and apply ESG (Environment, Social, Governance) criteria. With concrete actions ranging from improving forest governance to supporting the settlement of rural populations or climate change adaptation measures, we aim to make forest adaptation and conservation a reality.



## Demonstrating and catalysing the benefits of wilder nature as a nature-based climate solution

Rewilding Europe is a pioneering and ambitious, pan-European initiative with a mission to make Europe a wilder place, for the benefit of both nature and people. We demonstrate our vision in 10 large landscapes in Europe, led by local organisations that we support for at least 20 years. Our budget now reaches over 50 million euros since the start in 2011, funded by both public and private sources. Rewilding Europe and its partners currently work from 17 different European countries, including the European Rewilding Network with 85 members in 27 countries.

Central Apennines rewilding landscape, Italy.



## Nature is our best ally

Nature is our best ally when it comes to addressing both the climate and biodiversity emergencies. Naturally functioning ecosystems are the best and most cost-efficient way to lock up carbon and mitigate impact of climate change. Ten, ultimately 15, rewilding landscapes serve as inspirational examples of what can be achieved at a much larger scale. In these landscapes we demonstrate how rewilding can help address climate change adaptation and mitigation, thus delivering on the EU Green Deal. Besides, our approach also addresses challenges such as declining economic productivity, rural depopulation and land abandonment.



Nature-based business, Wild Farm, Rhodope Mountains, Bulgaria

European bison herd, Southern Carpathians, Romania



## Innovative approach

Rewilding is an innovative approach as it focusses on bringing back natural ecosystem processes rather than specific species or habitats as a cost-effective way to restore nature at scale. Restoring peatlands, rewilding forests, restoring wetlands and grasslands and steppe are some of the few examples we work on. We develop and apply a wide range of scalable models, tools and mechanisms of which some are very innovative. In our landscapes, people are a crucial element, working to provide new perspectives and possibilities for jobs, income, pride and identity – all benefiting local communities.

## Restoration of the water regime of waterways across southeastern Slovakia

BROZ has been involved in practical nature and landscape conservation for 25 years. In the beginning, it was mainly actions based on civic activism and volunteer work. Since 2003, many of the association's activities have been covered by LIFE projects supported by the European Commission and the Ministry of the Environment of the Slovak Republic, as well as by other types of projects. In cooperation with project partners, we have so far managed to connect 5 major side arms of the Danube (the Medvedovské, Veľkolélské, Devínské, Karloveské, and Ključovské side arms), which were reconnected to the main river bed after decades of degradation. In the years 2021–2022 we implemented a pilot project for the restoration of the Šulian arm, including the reconstruction of the C2 dam – one of the 30 parts of the linear dams located in the left-side arm system of the Danube between the

villages of Dobrohošť and Sap. In September, work will also be completed on the most extensive river restoration in Slovakia so far – on the Rudava River, whose bed is buried between sand dunes in the Záhorie region. As other important climate change adaptation measures, we have been restoring wetlands throughout south-western Slovakia for 25 years, and we are also focusing on restoring natural floodplain forests in the Danube region.

Veľký Lél side arm revitalization – accessing the upper inflow



## Veľký Lél side arm water regime restoration – the story continues



Restoration work on the river Rudava in western Slovakia

Within the LIFE BeeSandFish project (LIFE12 NAT/SK/001137), the 4th stage of the restoration of the water regime of the Veľký Lél side arm was implemented in 2022. This side arm of the Danube separates from the mainland one of the largest and now certainly the most picturesque Danube islands in Slovakia – Veľký Lél Island. As of June 2022, it is the only side arm of the Danube so far where revitalisation measures have succeeded in reconnecting its second inlet area (out of the original 5) to the main river bed, which has significantly contributed to improving the water regime of the entire arm. The positive effect is also evidenced by the results of ichthyological monitoring – after decades, the arm is once again serving as an important spawning ground for Danube fish species. Restoration in this side arm of the Danube started in 2013. Gradually, the first inlet into the arm was plugged and two previously closed outlets were opened. In the lower part of the arm, the damming of the arm was replaced by a bridge. In June 2022, the second inlet in the upper part of the arm was restored and the restoration of the third inlet is planned in the coming years within the framework of the LIFE Danube Meadows project (LIFE14 NAT/SK/001306).

## Cross-border cooperation project Alpine-Carpathian River Corridor, supported by the SK-AT Interreg programme



Natural section of the Rudava riverway

The natural, undisturbed section of the Rudava River is a jewel among the lowland rivers in Slovakia. It is an example of a watercourse without interference in its water regime, meandering in a deeply incised valley formed by sand dunes. Half of the length of the Rudava River has been regulated in the past in the form of an artificial, straight water channel. In 2022, part of the stream was revitalised. The restoration of the Rudava represents a unique project that has not been implemented in Slovakia so far. It concerns a part of the river with a total length of 2.2 km. As part of the modifications, both bank fortifications and rubble from the bottom of the riverbed were removed, and the river was re-meandered. Natural forms of fortification were used in areas of larger meanders where it was necessary to ensure bank stability. Woody plants that were blocking the new channel alignment were removed and horizontally incorporated into the bank with root balls pointing into the river bed, thus ensuring bank stability and also providing refuge for a number of species of fish and other aquatic animals.

## Forest arboreta: a century of experience – and inspiration for new forest management

At the end of the 19th century, the forest sector established test sites for 'new' forest tree species throughout Europe. It was the era of western and scientific discoveries of new territories, the time of colonization and industrial development.

These forest arboreta of exotic species often served as a collection, for education, and to select species that would improve the productivity of forests in Europe – as these have a rather poor number of species.

While the focus and management of the collections often changed, they represent decades of experience that might help us to take decisions on the use of new selections, new provenances, and new species in our forests. Forest arboreta are often years ahead when it comes to knowledge on the adaptability of tree species.

Many arboreta, set up about 100 years ago, illustrate the diversity of tree species, but simultaneously the impact of climate change on forest ecosystems



## The arboretum of Tervuren

Situated in the municipality of Tervuren near Brussels, the Geographic Arboretum is to be found at the northern border of the majestic Sonian Forest. The collection is set in a beautiful landscape park. More than a tree collection, this is a collection of forest types: about 30.000 trees and shrubs of more than 700 species from the temperate forests of the Northern Hemisphere are grouped here by region of origin in some hundred sections, covering a total of 120 ha.

It was set up in the context mentioned above over a century ago, in 1902. It served the forestry sector and the state forest administration since then – and it can do so again as climate change is experienced today through its impacts on the collection, illustrating what effects could be expected in the indigenous forests around.



The arboretum of Tervuren (near Brussels, Belgium) is a collection of forest types of the Northern Hemisphere

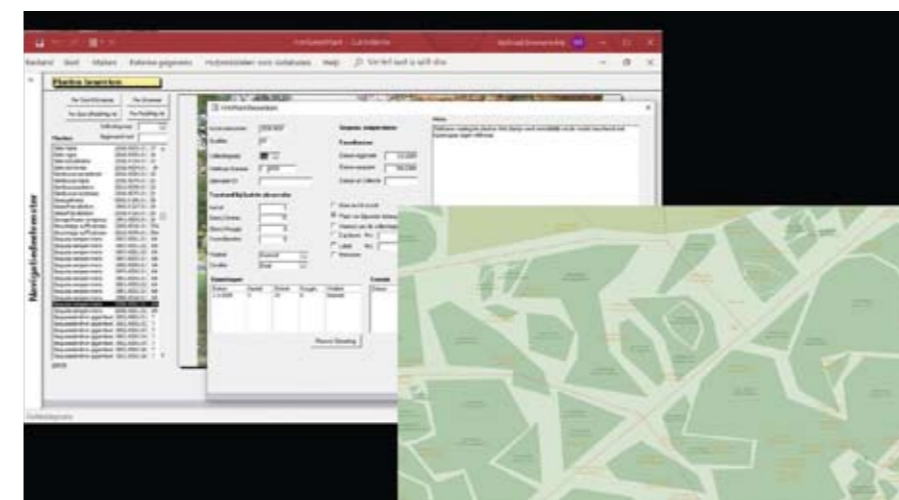
## Disclose the data and knowledge of collections and test sites

The botanical garden of Meise and the arboretum of Tervuren are cooperating on a project to encourage and improve data exchange between collections, foresters, and nurseries.

The first step will be to use, adjust and extend existing data standards to better share information. By doing so, the project wants to make the data and experiences of botanical collections available to forest management professionals. Arboreta can compare their data on tree species in different climatic and edaphic conditions, but they often have valuable know-how on tree nursery activities, too. Therefore, we aim to ensure quick and easy communication with both forestry and tree nurseries.

Bringing together these experiences and data should feed the scenarios and models of forest succession development under the changing climatic conditions we already face today.

In this way our arboreta, older than a century, will then help us to cope with the immense challenges that the forests of the future are facing.



Data about existing collections of tree species include crucial information for foresters and tree nurseries facing unseen challenges in the upcoming decades

## LIFE for MIREs – Národní Park Šumava

The „LIFE for MIREs“ project (full name „Trans-boundary Restoration of Mires for Biodiversity and Landscape Hydrology in Sumava and Bavarian Forest“) is a large transboundary project aimed at the hydrological restoration of wetlands on both the Czech and German sides of the Sumava Mts. Four important regional institutions joined together to implement this project: Šumava National Park (as the coordinating beneficiary), National Park Bavarian Forest, Bund Naturschutz in Bayern e.V., and the University of South Bohemia (as partners). The project started in 2018 and will be completed in 2024. The total cost is EUR 5,845,002, 65% of which are covered by the EU fund „LIFE Nature and Biodiversity“. A majority of the costs is intended for restoration measures in the field.



## What is the project about

Šumava is an important mire and spring area in Central Europe. A third of the territory is covered by wetlands, many of which have been drained in the past. This drainage has caused both the degradation of valuable habitats and hydrological changes in the landscape.

The main aim of the LIFE project is  
i) to improve the natural state of unique mires and wetlands and  
ii) to restore near natural hydrology on total area of 2059 ha.

The key restoration measures include the blocking and infilling of drainage ditches, restoration of springs, and the reinstatement of natural streams. In total, more than 100 km of drainage ditches will be removed and more than 20 km of small mountain streams will be restored. A rise of the water table in restored wetlands (already recorded in the magnitude of tens of cm) and improvement in both long-term water accumulation and retention in the landscape are expected. Implemented measures will also help mitigate negative impacts of extreme events (dry periods or floods) related to climate change. The volume of water retained in the landscape should increase by at least 150,000 m<sup>3</sup>. The restored wetlands can also mitigate landscape overheating locally, and a reduced degradation of mires and enhanced peat-forming processes should lead to a reduction of CO<sub>2</sub> emissions by up to 125t. The monitoring and assessment of restoration effects on key variables of the environment and biota are involved in the project.

Education aimed at increasing public awareness about the importance of wetlands to the landscape is also a part of the project. A lot of volunteer events are organized where the public is directly involved in rescue of wetlands – over 800 volunteers have already participated in dozens of events. Other important project outputs include a popular film about wetlands, an educational program for children in nature, and textbooks about water and wetlands for school children.



## Innovative elements of the project

Among innovative elements of the project are technologies and methods developed for the hydrological restoration in sloping mountain wetlands:

- 1/ Concept of Target Water Table: restoration of oligo/mesotrophic mountain mires and wetlands on sloping surface
- 2/ Restoration methods for oligo/mesotrophic mountain springs of the helocrene type
- 3/ Technology for restoration of the original stream in the line of the erosion trench



## Adaption strategy in forests of Mendel university in Brno

The Mendel University forests managed by the Training Forest Enterprise Křtiny are located northeast of the city of Brno, covering an area of 100 km<sup>2</sup>. The primarily deciduous and mixed forests serve mainly as a natural laboratory for students and scientists. In addition, they also fulfil the commercial and recreational functions – mainly in suburban locations. We are the first forest estate in the Czech Republic where a complex forest adaption strategy to climate change was developed in 2021, namely under the Norway grants (call: SGS-3 „Oslo“).

Aerial photo of university forest



## What is the project about

Drought and homogenous forest structure are nowadays key stress-causing factors for the deteriorating health and disintegration of forests in the Central Europe. Our adaption strategy includes the complex solution of green and blue infrastructure across the estate. The goal is healthy resilient forests adapted to expected climate extremes, but still fulfilling required timber production, including ecosystem services for the public and creation of a number of demonstration / training areas and research plots.



Citizens involving in our activities – establishing their diverse forest

## Innovative elements of the project

In the green infrastructure, 9 basic adaptation measures and 16 silvicultural models are implemented in practice on a large-scale level. In general, we manage our forests in a close-to-nature system aiming for diverse (mixed and unevenaged) forests. In this, we make full use of natural processes and individual selection principles of tree harvest. 9 % of forests are left without human intervention for natural development as reserves. We are also active in leaving dead wood to decompose to increase biodiversity. As part of blue infrastructure, we build an extensive network of retention ponds, forest pools and wells. We also involve the public in our activities.



Design of a system of retention reservoirs near the city

## The Living Landscape Model

The Living Landscape model uniquely uses the latest scientific knowledge on climate change and its impacts on the landscape. Then, through the active involvement of trained citizens, it designs feasibility studies that systematically and comprehensively address issues such as drought, loss of fertile soil, and water and wind erosion through a synergy of hundreds of small, nature-based measures. We aim to process the whole territory of the Czech Republic and propose a Landscape Adaptation Plan for the Czech Republic to climate change and develop the method within the EU. The feasibility study of the Living Landscape Model is an important basis for the state, regions, and municipalities to present the potential of a particular territory to remediate and adapt to climate change as effectively as possible. The Feasibility Study serves to negotiate with municipalities, state governments, landowners, farmers and foresters, and all other stakeholders, with whom we work together to find a satisfactory solution for all (win-win strategy) who make decisions about or care for the landscape.



## What is the project about

The Living Landscapes model is a unique comprehensive system solution for landscapes in whole catchments. It fragments large tracts of arable land into smaller parts, which promotes the restoration of the hydrological regime of the landscape and slows down water runoff during both dry periods and flash floods. The application of our know-how reduces water and wind erosion of the soil, and the integration of greenery into the landscape also allows for the greater interception of horizontal precipitation (dew, mist) and cooling of the surroundings. It also uses some of the water captured in drainage systems and returns it to the landscape instead of draining the fields. The Model proposes a new landscape contouring based on the Czech University of Life Sciences Prague methodology. It proposes the creation of a series of small nature-friendly measures in the landscape, such as pools, small water reservoirs, polders, swales, terrain waves, woods, grassy strips around streams, windbreaks, terrain waves, a series of eccentric mini-polders, etc., recommends revitalization of streams, works with floodplains and controlled spillways to protect human settlements against floods.



## Innovative elements of the project

The Living Landscapes model is a comprehensive, versatile, digital tool that addresses rapid adaptation to climate change through landscapes using citizen science and by replicating ready-made models of specific land types. It first carries out a thorough and accurate mapping of the existing state of the territory on the ground, through which it proposes the most appropriate solutions in specific locations. It proposes a basic, minimally necessary skeleton of landscape remediation limits, at the feasibility study level, so that the basis of the landscape can be designed, but also further discussed and changed according to the requirements of owners, municipalities, and government. It addresses the entire area, ideally the catchment areas from the source area of a minimum of 10 km<sup>2</sup>. The project also ensures public education and participation of the trained public, who subsequently become local coordinators of the Living Landscape project.

## Hnutí DUHA

Hnutí DUHA – Friends of the Earth Czech Republic has been organising Weeks for the Landscape for 25 years. These are work-educational, week-long events for volunteers on various locations across the Czech Republic. We cooperate with organisations such as the Nature Conservation Agency of the Czech Republic, National Park administrations, private land owners, mayors, and state or church land stewards. Over the years, more than 2 000 volunteers have joined us in the field.

## What is the project about

Activities carried out by the volunteers in consultation with land owners or managers are primarily aimed at promoting the natural regeneration of forests. This is done, for example, by the fencing of rejuvenating stands or other protection against game animals, which are very overpopulated in the Czech Republic, sowing pioneer tree seeds, or planting and maintaining of biocorridors, copses, pools, or dams in peat bogs. Unfortunately, even the 85 000 hours worked across 170 tours have been far from enough to solve all the problems of Czech forests. We are aware of the need to also promote forests diversified in age, species, and space – and this will be done primarily by changing legislation and financially motivating their owners to change to adapt them to climate change.



## Innovative elements of the project



Photos: JANA K. KUDRNOVÁ

We frequently return to many sites, allowing volunteers to see the power of natural processes they helped bring about. This experience is important in fostering the understanding that forests are much more than just a timber factory. The concepts which we apply when planning our work are based on only on active steps, but also the protection of spontaneous processes. In Czech national parks, for example, the key is to protect the undisturbed course of natural processes in their natural dynamics on the predominant area of the territory – but there must be more such places left to wild nature. Only if this is achieved will we be able to see the true level of forest adaptation and response to climate change, and manage them accordingly. We also apply the concept of proforestation to protect old-growth forests.

## Agriculture Landscape Restoration Project in Zálúčí near Blatnička

In 2015, around 65 hectares of arable land was restored to traditional landscape which had disappeared during the forced collectivisation period. The project was initiated by a landowner and farmer with the engagement of the public. Unique 'Orchard of Lovers' was planted by couples in love, who each adopted their own cherry tree. In addition to the significant environmental benefits, a landscape attractive for people has been created.

### What is the project about

The uniform monocultural landscape, a consequence of forced collectivization of agriculture in the last century, was divided into land blocks smaller than 10 hectares. The aim of the restoration of the natural landscape structure was to increase the overall ecological stability and biodiversity. The area is now characterised by a varied mix of farming methods – arable land, undemanding extensive orchards, fruit tree alleys with shrubs, grassed strips with various plant species, meadows and fallow fields. There are also organic production orchards in part of the area. The division into smaller land blocks improved the permeability of the landscape, reduced water and wind erosion and improved adaptation to drought and torrential rains.

Attractive countryside  
landscape teeming  
with life



### Innovative elements of the project

The large-scale restoration project was run by farmer and co-financed through the farmer's resources, donations, volunteer work, and partially agricultural subsidies and a subsidy programme for the restoration of natural functions of the landscape administrated by the Ministry of the Environment. The planting of trees by children is of educational significance. The project inspired many landowners and representatives of municipalities, who run similar landscape restoration projects. Gained experience is shared through the programme Živá půda (Living Soil).



Aerial view of the  
landscape

Fruit tree alleys with shrubs  
on grassed strips



## Comprehensive landscape planning as an essential tool for climate change adaptation: landscape studies for Potvorov (2022, 623 ha), Středokluky (2020, 554 ha) and Kostelní Lhota (2018, 865 ha)

The presented landscape studies (municipalities of Potvorov, Středokluky, and Kostelní Lhota) are an example of a comprehensive approach to landscape planning, remaining unique countrywide. The landscape plans (spatial studies) are incorporated in the spatial planning of these municipalities and have been reflected in their spatial planning documents as well as in the decision-making processes. The landscape-oriented spatial planning documents are a systematic tool for the detailed definition of the priorities and objectives set by the communities and help to form the development of the follow-up projects.



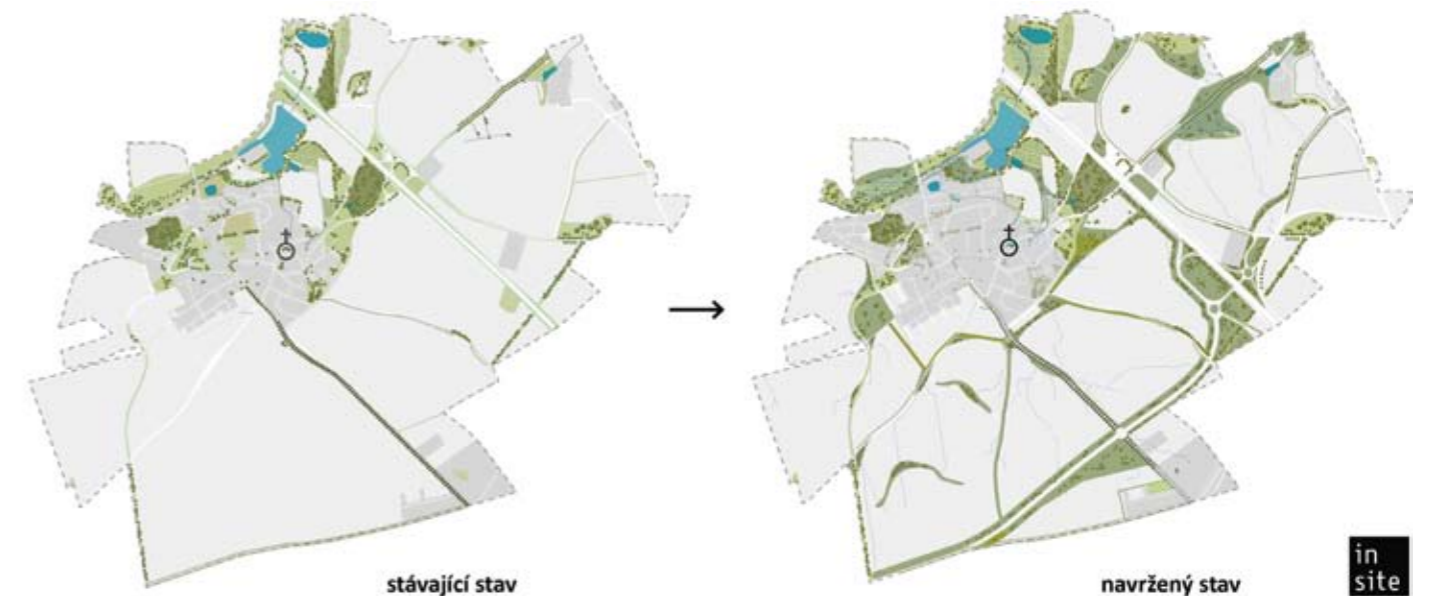
Landscape planning identifies sound landscape structures and defines multifunctional objects (current and proposed state of river Výrovka in Kostelní Lhota)

## Landscape: source of ecosystem services and home for the people

The landscape and its social and cultural aspects form a continuous system including settlements, agricultural areas, forests, and protected areas. This scope of features and ecosystem services calls for a comprehensive approach. We proceed by identifying landscape structures promoting resilience, and defining multifunctional objects serving for water retention, soil protection, eco-stabilisation, biodiversity residential, and other functions. We promote the formation of close-to-nature ecosystems. Our approach for designing green (resp. green blue) infrastructure is based on public participation.

## The Czech Republic landscape planning methodology framework

The presented landscape planning studies for the three municipalities are part of the team long-term project aiming to create a methodological framework for landscape planning presently absent at the national level. Spatial study as a spatial planning document allows comprehensive working with the landscape and incorporates innovative ideas and themes not yet addressed in current legislation and landscape management such as landscape-based water retention features. It also allows sharing variety of functions in a single space therefore defining a coherent green infrastructure system.



Scheme of landscape plan for municipality of Středokluky: current and proposed state

## EU Mission: Adaptation to Climate Change

The Mission on Adaptation to Climate Change focuses on supporting EU regions in their efforts to build resilience to the impacts of climate change. It works at the crossroads between research and innovation, climate and regional policies and invites actors from all these domains to work together.



## What is the project about

The Mission is a momentous task, because despite our efforts to cut greenhouse gas emissions and work towards a climate-neutral EU, we cannot forget that the climate is already warming up. The responses and measures need to be tailor-made as climate change impacts affect different regions, sectors of the economy and members of society in different ways. This is where the Adaptation Mission comes in. It contributes to putting the EU's adaptation strategy in practice by helping regions to better understand the climate risks they are and will be confronted with in the future, to develop their pathways to be better prepared and cope with the changing climate, and to test and deploy on the ground the solutions needed to build resilience.

## Innovative elements of the project

The Mission looks at several themes with a place-based approach: critical infrastructure, land use and food systems, water management, and health and wellbeing, and enabling conditions like knowledge, governance or behavioural change. A key cross-cutting element is working with nature and with ecosystems to make cities, regions, coastlines, river basins, or forests more resilient. In all these areas, research and innovation have a key role to play. This is why the Mission will support testing, demonstrating and deploying concrete solutions at large scale. To identify interested parties, the Mission also launched a Mission Charter for regional and local authorities. Signatories declare their willingness to cooperate, mobilise resources and develop activities in their respective region and communities to reach their adaptation goals.



## The Mission ‘A Soil Deal for Europe’: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

Life on Earth depends on healthy soils. Soil is the foundation of our food systems. It also provides clean water and habitats for biodiversity while contributing to climate resilience. Soils are major carbon reservoirs, which help slow the onset of climate change while helping us to cope better with the effects of extreme climatic events such as drought and floods. Despite their importance, it is estimated that between 60 and 70% of EU soils are unhealthy, i.e. not able to perform their vital functions. The EU Mission ‘A Soil Deal for Europe’ aims at supporting sustainable soil management and restoration as part of a wider, green transition in rural and urban areas, involving all sectors of society and triggering action across all types of land uses.

### The 8 specific objectives of the Mission:

1. reduce desertification
2. conserve soil organic carbon stocks
3. stop soil sealing and increase re-use of urban soils
4. reduce soil pollution and enhance restoration
5. prevent erosion
6. improve soil structure to enhance soil biodiversity
7. reduce the EU global footprint on soils
8. improve soil literacy in society

## The 4 building blocks of the Mission

The Mission is a European Commission initiative that contributes to achieve the Sustainable Development Goals (SDGs), and the European Green Deal targets on sustainable farming, climate resilience, biodiversity and zero-pollution. Indeed, it is part of the Farm to Fork Strategy; the Climate Adaptation Strategy; the Zero Pollution Action Plan for air, water and soil; the Long-term vision for the EU’s rural areas; and the EU Soil Strategy. The Mission activities will also support the upcoming Soil health law.



To achieve its specific objectives, the Mission will be implemented through four “building blocks”:

- (1) an ambitious research and innovation programme to build the knowledge base for innovations on soil health and its support to ecosystem services;
- (2) a network of 100 living labs and lighthouses that will experiment and showcase solutions for improving soil health;
- (3) a harmonised framework for EU soil monitoring;
- (4) soil literacy, communication and citizen engagement to increase societal awareness on the vital importance of soil and involve people from all walks of life in mission activities.



## Funding opportunities under the European Framework Programme for research and innovation Horizon Europe to contribute to the Mission

A Horizon Europe call for proposals with a total budget of 95 million euros is open until 27 September 2022 under the Soil Deal Mission. Projects funded under this call will contribute to the Mission’s specific objectives, e.g. through advancing soil carbon monitoring, reporting and verification; promoting carbon farming and fostering soil education.

- HORIZON-MISS-2022-SOIL-01-01: Building the mission’s knowledge repository and advancing the European Soil Observatory
- HORIZON-MISS-2022-SOIL-01-02: Improving food systems sustainability and soil health with food processing residues
- HORIZON-MISS-2022-SOIL-01-03: Soil biodiversity and its contribution to ecosystem services
- HORIZON-MISS-2022-SOIL-01-04: Remediation strategies, methods and financial models for decontamination and reuse of land in urban and rural areas
- HORIZON-MISS-2022-SOIL-01-05: Network on carbon farming for agricultural and forest soils
- HORIZON-MISS-2022-SOIL-01-06: Monitoring, reporting and verification of soil carbon and greenhouse gases balance
- HORIZON-MISS-2022-SOIL-01-07: Foster soil education across society
- HORIZON-MISS-2022-SOIL-01-08: Innovations for soil improvement from bio-waste
- HORIZON-MISS-2022-SOIL-01-09: Citizen science for soil health
- HORIZON-MISS-2022-SOIL-01-10: Framework Partnership Agreement (FPA) for a Living Lab network support structure



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Apply at: <https://europa.eu/!8fjYD6>



Building the mission's knowledge repository and advancing the European Soil Observatory	6 [M€]
Improving food systems sustainability and soil health with food processing residues	14 [M€]
Soil biodiversity and its contribution to ecosystem services	16 [M€]
Remediation strategies, methods and financial models for decontamination and reuse of land in urban and rural areas	21 [M€]
Monitoring, reporting and verification of soil carbon and GHG balance	14 [M€]
Network on carbon farming for agricultural and forest soils	3 [M€]
Foster soil education across society	6 [M€]
Citizen science for soil health	6 [M€]
Innovations for soil improvement from bio-waste	9 [M€]

## Monitoring of Soil Erosion of Agricultural Land

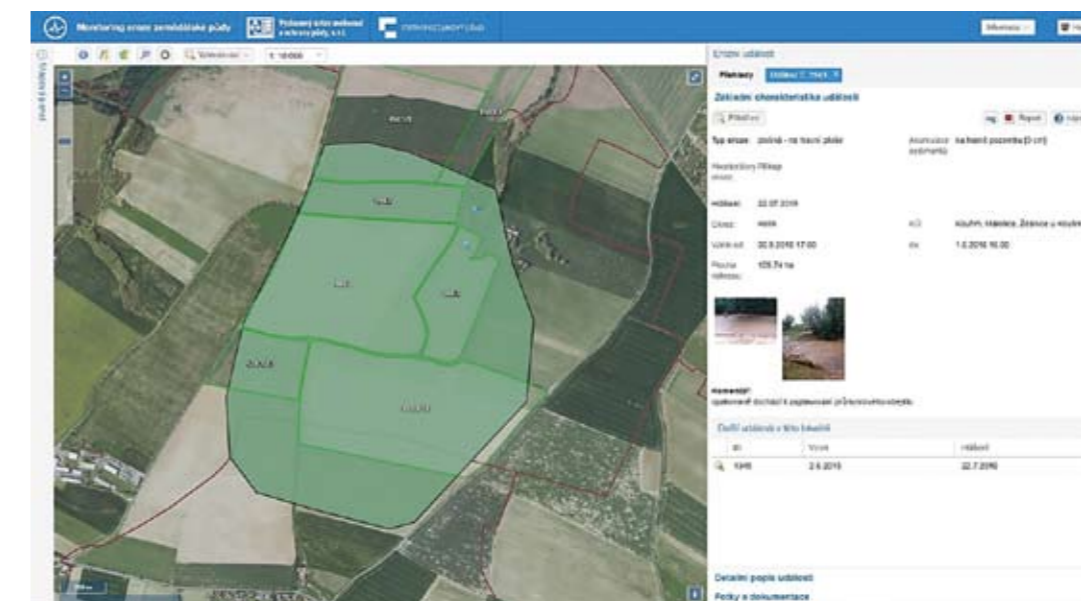
The State Land Office (SLO) in cooperation with Research Institute for Soil and Water Conservation (RISWC) established the project 'Monitoring of Soil Erosion of Agricultural Land' in 2012. This is nationwide monitoring based on the announcing of erosion events by the public. In this system we have recorded so far 2,395 erosion events from which 319 are repeated. This project is financed by state budget – through SLO. Costs of project are calculated approximately to 300,000 EUR per year.



Soil erosion in Czech Republic

## How can we reduce negative impact of water erosion to agricultural soil?

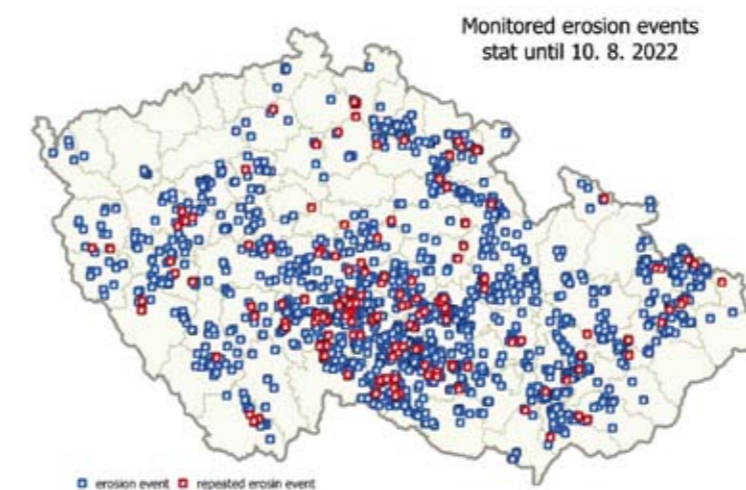
Monitoring of Soil Erosion of Agricultural Land is a unique tool for nationwide data collection of soil erosion events. The system serves as feedback for the setting of soil erosion control measures in the agricultural subsidy policy, as an information source for targeting of Land Consolidation and, consequently, concrete measures. From 2021, it is also part of the national legislation in protecting agricultural land against of soil erosion. The project serves to report, record and evaluate individual erosion events. The outputs of analysis of the monitored events have a wide application in public and private sphere. In particular these are the basis for effective state administration decision-making, design of soil erosion control measures and for the preparation of new policies in the field of soil protection. Anybody can announce erosion event, authorized employee of SLO consequently ensure a field reconnaissance and results are recorded via web site to database.



Web site of the Monitoring of Soil Erosion of Agricultural Land

## This year, a new innovative element is used in this project

Since 2017, evaluation of selected erosion events (repeated and events with more significant economic damage) is underway. If the evaluated erosion event meets the selected criteria, the rules for farming within the agricultural subsidy policy are tightened on this recorded area. So far, the management of approximately 5,500 ha has been tightened in this way.



Recorded erosion events in Czech Republic until 10th August 2022

In the Czech Republic, we still lack a clearer overview of the real extent of soil erosion. That is why SLO and RISWC developed, and this year implemented, the Probability Model of Soil Erosion. This model is using the processing and evaluation of satellite images and relevant precipitation episodes and is applied to the entire territory of the Czech Republic. This system therefore detects erosion events in an automated way and provides a realistic view of the extent of emerging erosion events in the Czech Republic. The system can also be used as a source of information for verifying the effectiveness of selected soil erosion control measures within the agricultural subsidy policy.

Climate-smart Forest Management for Central and Eastern Europe CLIMAFORCEELIFE; Duration: 01/09/2020 – 31/12/2027, Total budget: 5,587,063 EUR; Project is co-funded from LIFE Programme of the European Union, state budget of the Slovak Republic through the Ministry of the Environment of the Slovak Republic and own contributions of the project beneficiaries.



Forests of the Central and Eastern Europe represent an important natural resource. It is not just because of increasing demand for wood, but also due to other ecosystem services forests provide, including climate change mitigation. However, forests are vulnerable to climate change effects too. To maintain forests and their services in CEE, forest management have to shift from conventional to climate-smart. With this aim

WWF Slovakia joined forces in the CLIMAFORCEELIFE project with partners from 5 EU countries: Forests of Slovak Republic, Czech University of Life Sciences, WWF Hungary, MEGOSZ, WWF Romania, WWF Bulgaria and South-Western State Forest Enterprise of Bulgaria.

## Climate-smart forest management for Central and Eastern Europe

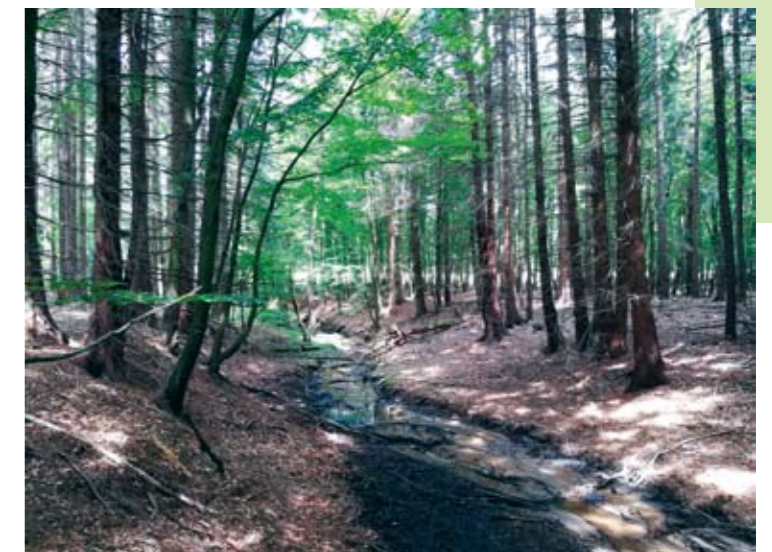


The current forest management will need to adapt to climate change to mitigate its negative effects on forests (such as drought, increased water run-off, soil erosion, etc.) and increase their resilience instead. Since the same challenges can be seen in more CEE countries, CLIMAFORCEELIFE project aims to test and adapt alternative management models in each country specifically to the local conditions by:

- Reviewing existing forest management models
- Demonstrating and evaluating climate-smart forestry measures in Slovakia and Bulgaria
- Strengthening and replicating CSFM through management plans and programming documents for EU funds
- Increasing awareness on CSFM among professionals and public in CEE region

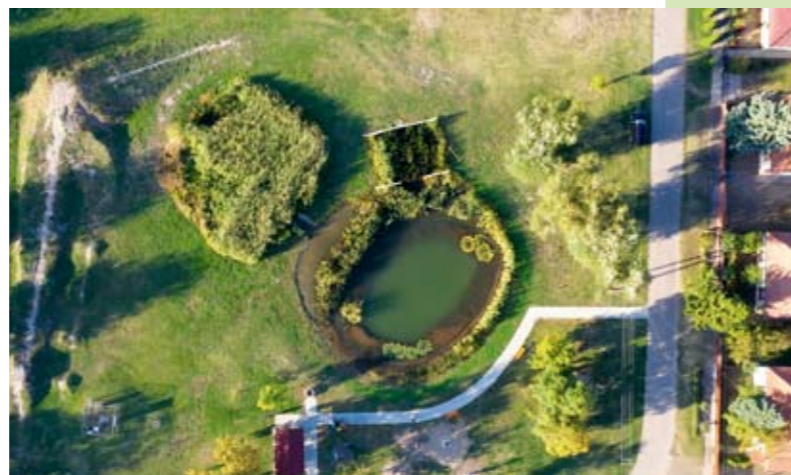
## Demonstration measures to adapt forests to climate change

Thinning in pine monocultures aims to improve the vitality and resilience of young stands, to diversify their spatial structure and species composition, allowing introduction of broad-leaved species. On 48 ha of mature pine stands, we will test appropriate intensity of thinning to improve vitality and resilience of individual trees as well as age, species and spatial diversity of the whole forest stand by boosting natural regeneration. If successful, shift from clear-cut to shelter-wood or selective management system will be possible in pine forests in the future. Local water retention, such as blockage of drainage ditches, reconstruction of small water reservoirs, will improve forest resilience too. The total area where CSFM will be applied represents 1793ha.



## LIFE Logos4Waters – Integrated application of innovative water management methods at river basin by coordination of local governments (LIFE20 CCA/HU/1604)

Duration of the implementation:  
1 October 2021 – 30 September 2025  
Total budget:  
3 764 915 € (approx. 1.318 million Ft)  
EU contribution:  
2 070 703 € (which is 55% of the total budget, approx. 725 million HUF)  
National contribution:  
1 694 212 € (approx. 593 million HUF),  
co-financed by the Hungarian State



## Water management and climate change in Hungary



Over the past 250 years, **water-management in Hungary focused on draining wetlands, regulating rivers for navigation, building dykes and large-scale grey infrastructure for flood defence**, protecting agricultural land from excess inland water, and developing irrigation systems.

As a result, **the water-balance of Hungary is negative**: on average 7km<sup>3</sup> of surface and sub-surface water is lost each year. At the same time, the major part of the country is prone to droughts, the potential evapotranspiration is higher than the annual precipitation, and some parts of the country face long-term sinking of the groundwater table.

**It is increasingly urgent to shift the water-management paradigm from a drainage-based to a retention based one**, as this will help buffer against hydrological extremes such as longer droughts and heavier rain events that are becoming more frequent with the onset of climate change. The LIFE LOGOS 4 WATERS project aims to contribute towards that goal.

During the 4 year-long project we **implement complex natural water retention measures** under the cooperation of local municipalities on two catchments: one lowland and one highland catchment. Integrated implementation of NWRMs on a catchment level boosts local and regional resilience to impacts of climate change and improves the natural environment.

**This work builds on the experiences of the LIFE MICACC project** implemented between 2017–2021.

## Innovative elements of the project

### Innovation:

The project is innovative as it **places local municipalities to the heart of water management**: local municipalities understand local needs and circumstances best, and they are well placed to find integrated solutions.

The project is also innovative as it **seeks to solve water-management issues through a retention-based approach**, rather than a drainage-based one. This way, it can mitigate food risk

The project also encourages co-operation on a catchment-level between local municipalities, and **implement water-retention measures that are complementary to each-other**.

### Experiences from previous work:

**Local municipality leaders**, once they learn about climate change and water management issues, **are eager to engage** and are usually committed to retaining water.

The **pressure towards creating a constant open water surface** in these aquatic habitats is strong from both municipality leaders and local residents. This makes the **creation of lakes more favoured** than the creation of other types of wetlands, or periodically flooded reservoirs, even if this is not the most ideal from a CCA and water-management perspective, and **sometimes is not feasible** due

to lack of sufficient surface water resources. However, this way the solution can be truly integrated, and can bring recreational, aesthetic, micro-climate regulating, and other benefits as well.

**Many actors are involved in the creation of such a measure, and the lack of a common knowledge-base** can make the permitting process of such multi-role projects difficult. There is a need to create a common knowledge-base.

**Land ownership structure is a key limitation** to implementing on-field measures. The areas that are most suitable for water-retention are defined by geography, but if a local municipality has no land-ownership at these locations, it becomes very difficult to intervene.

### Project partners:

Ministry of Interior (lead), General Directorate for Water Management, University of Public Service, Municipality of Püspöckszilágy, Municipality of Bática, WWF Hungary Foundation, Association of Climate Friendly Municipalities



## What is InterSucho?

A complex system for monitoring and forecasting drought status and impacts ([www.InterDrought.cz](http://www.InterDrought.cz)) which has been operational since 2014, and has seen the worst droughts in the modern history of the Czech lands. It combines detailed soil moisture modelling data, based on a uniquely dense system of climate and precipitation stations, with a forecasting model, dedicated forest and soil moisture stations, several satellites, and a network of hundreds of farmers and other practitioners providing invaluable inputs each week.



The workload is handled primarily by a team from the Global Change Research Centre based at the Czech Academy of Sciences, with data support from the Czech Hydrometeorological Institute and financial participation of the State Land Office. Results are shared with farmers, farmer NGO's, ministries, but also the press or the European Commission through the European Drought Observatory.

The system operational costs are estimated at 100,000 Euros per year, as the system runs partly thanks to the enthusiasm and work efficiency of participating scientists, programmers, and other colleagues. The participating international team has developed unique interdisciplinary expertise and skills while at the same time making data on drought events accessible to other researchers.

## How do we monitor drought?

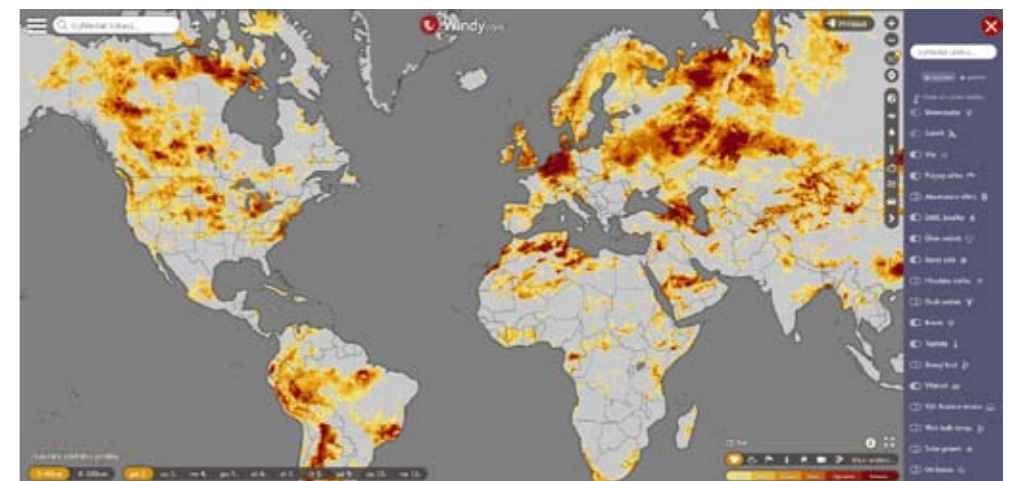
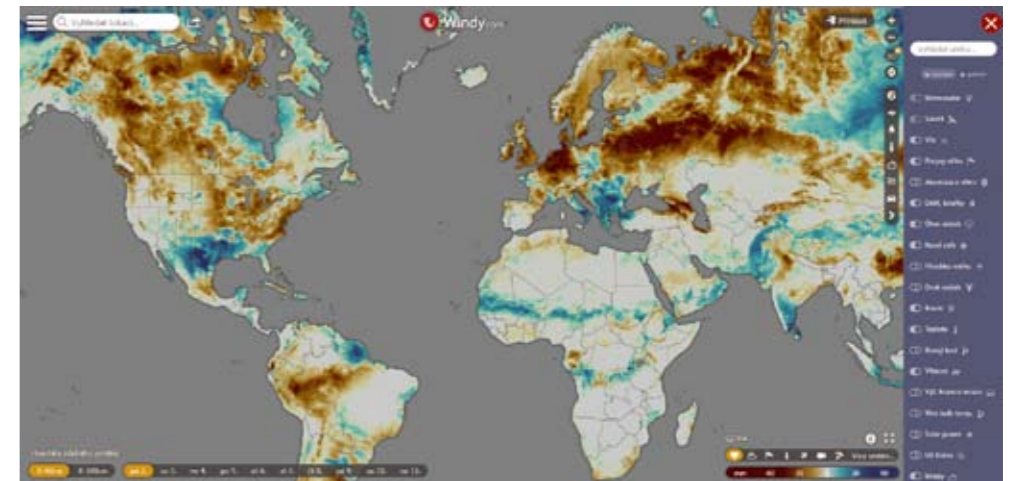
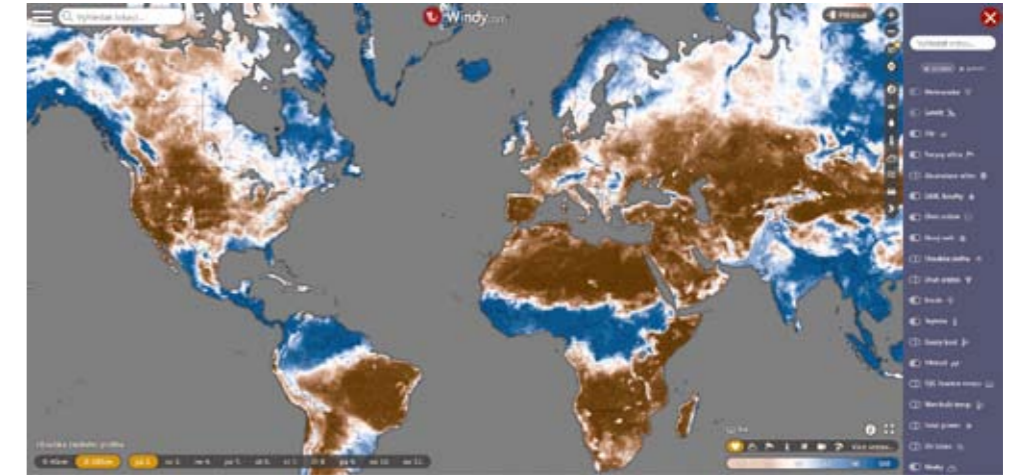
We take advantage of a dedicated soil moisture model that has been specifically developed for drought monitoring and perfected by the InterDrought team as well as immense climate, soil, and vegetation datasets combined by the project staff. This allows detailed and real-time reporting of each drought episode, quantification of its impacts, and estimation of its future development. The system provides a drought forecast based on 5 continuously evaluated prediction

models up to 9 days ahead, and then long-term statistical forecasts up to 6 months. At the same time detailed information on drought impacts is provided both through ground stations, observers, and satellite data. All datasets are accessible free of charge and in maximum resolution.

## Where do we monitor drought?

The system covers the Czech Republic with its detailed 500x500 m maps since 2014 and Slovakia since 2016. Since 2016, wider Central European data has been made available allowing for developing contextual understanding of the current situation both in terms of meteorology but also its impacts. The most marked development has been global expansion of the system that has become reality in 2020.

Currently the InterDrought.cz website provides the only operational daily drought forecast for all landmass for the next 9 days in collaboration with the Windy.com platform. This allows not only scientists but also the wide public to precisely follow recent droughts across the globe, whether it is the current drought in the Rhine river basin or the devastating drought that recently affected large parts of Yangtze river. The [www.interdrought.cz](http://www.interdrought.cz) solution offers know-how and tools to deal with early warnings of climate extremes which are projected to become prominent across major regions of the World over the coming decades.



## MERLIN Project

Upscaling into broader landscapes: MERLIN identifies landscapes with high potential and priority for transformative restoration, particularly focusing on essential ecosystem services, biodiversity targets, and climate change mitigation and adaptation. MERLIN illustrates environmental value chains as well as costs and benefits of Nature-based Solutions for selected European regions. This economic analysis demonstrates the opportunities for green business resulting from transformative restoration. The picture shows the MERLIN case study "Room for the Rhine branches" (Netherlands).



### More information

Website <https://project-merlin.eu/>

Contact person Prof. Dr. Daniel Hering

Email address [info@project-merlin.eu](mailto:info@project-merlin.eu)

Social media <https://twitter.com/euMERLINproject>

## What is the project about

Demonstrating best-practice restoration: For 17 flagship restoration projects across Europe, the EU-funded project MERLIN\* explores social, economic and environmental success factors, generating a blueprint for the proficient implementation of Nature-based Solutions suited for immediate replication. With investing more than 10 million € in further hands-on upscaling measures, MERLIN upgrades these 17 projects into radiant beacons of innovation for the systemic change. These include the removal of weirs and dams, re-wetting of peatlands and measures to

connect rivers and their floodplains. The picture shows the removal of a dam in the Basque country (MERLIN case study area).

\*funded under the European Commission's Horizon 2020 programme (grant agreement No 101036337)



## Innovative elements of the project

Engaging with investors and economic sectors: MERLIN closely collaborates with local communities and key economic sectors such as agriculture, water supply, navigation and insurance industry. Main focus is to co-develop win-win solutions spearheading systemic economic, social and environmental change. MERLIN delineates models for private investment into restoration alongside public funding, tailored to contexts specific for economic sectors and countries. The restoration of the Emscher catchment (Germany) has mainly been financed by fees, another less commonly employed financing mechanism. The picture shows flowering meadows on dikes along the Emscher, which can even be developed in highly urbanised catchments.



## Sonian forest – old growth forest character within walking distance of the Brussels city centre

In the hart of Belgium, in the Brabant province, several well-known forests dominate the landscape. The Sonian forest is to be found on less then 15 km from the Brussels Grand Place, but also the world-known Hallerbos ('the blue forest of Belgium') and the famous Meerdaalwoud, close to Leuven belong to the Forests of Brabant. The valley of the Dijle, among the most natural valleys of Belgium, completes the picture.

On the three Belgian regions (Flanders, Wallonia, Brussels)

- Project area 47.000 ha
- Nature 19.000 ha
- 21 Natura 2000 habitats
- 13 Special Protection Areas

85% of old forests (continuous forest cover since 1785), above 10.000 monumental trees, natural valleys, a rich and diverse agricultural landscape, several hundreds of protected heritage (monuments, landscapes)

Forests and other natural vegetation dominate the landscape of the forests of Brabant.

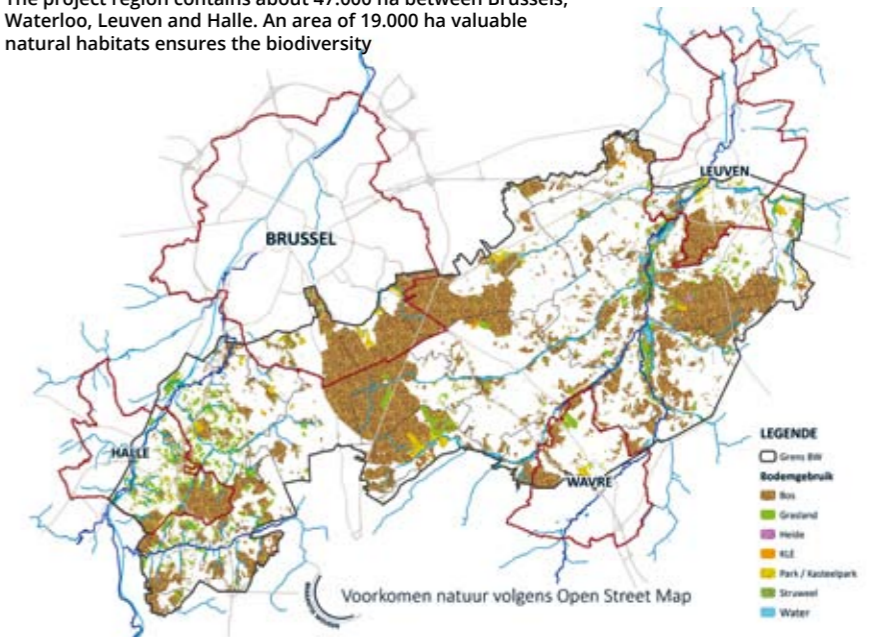


## The most climate friendly National Park in Belgium

The Flemish and the Walloon governments launched a call to select a number of National Parks: areas of outstanding biodiversity with a potential for sustainable touristic development. A coalition of local, regional and national authorities together with an NGO introduced an ambitious list of targets for the Forests of Brabant.

Among these: striving for being the most climate friendly National Park in Belgium. Reducing energy consumption, building resilient ecosystems and infrastructure, enhance the awareness of climate change and biodiversity loss are main targets of the National Park project.

The project region contains about 47.000 ha between Brussels, Waterloo, Leuven and Halle. An area of 19.000 ha valuable natural habitats ensures the biodiversity



## Adapting nature, adapting the management

We work on all aspects of landscape and nature management. There is a strong emphasis on

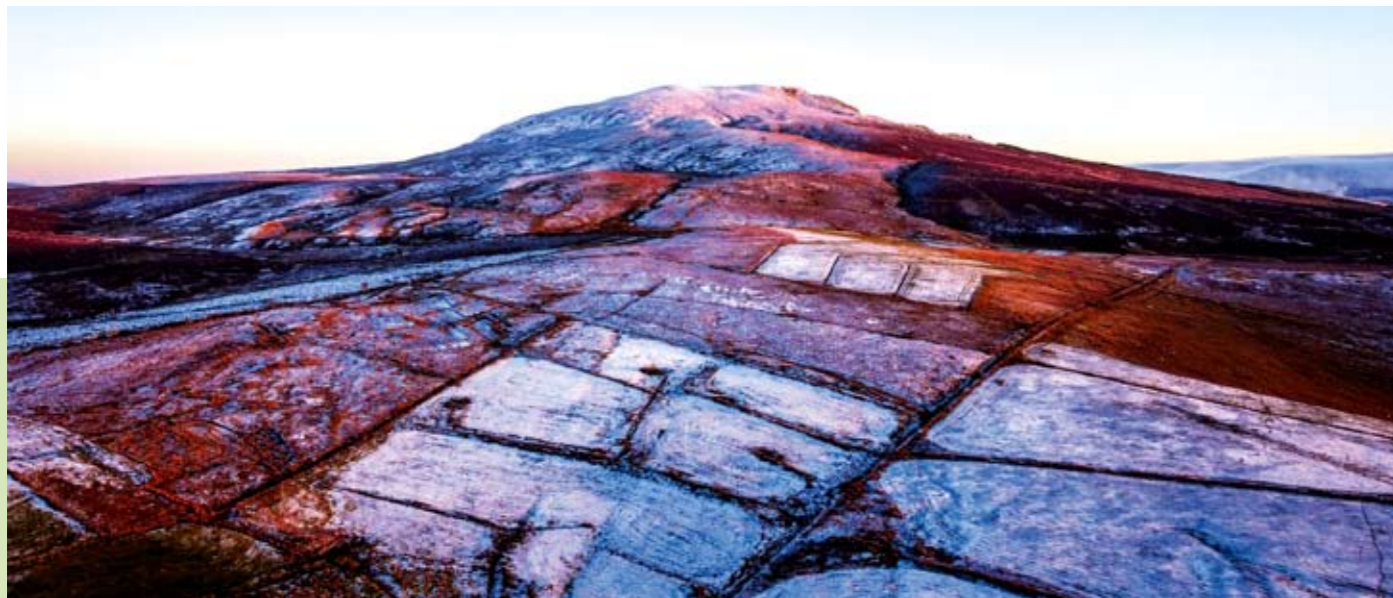
We try to:

- Strive for 25% in non-intervention management
- Increase the forest cover by 500 ha
- Connect nature reserves and forest patches by changing land use to natural habitats
- Optimize water quality and capture and hold water in all valleys, as part of a "blue deal" program
- Reduce the paved surface by 20%
- Increase carbon emission capture in natural and agricultural ecosystems through tree planting, forest extension and soil structure
- Reduce light emissions in the core areas by half
- Develop planning for urbanized areas on tree cover (every village 1000 extra trees by 2024), on rainwater use, on garden biodiversity volunteers, etc.

Specific action is taken in all parts of the landscape



# WaterLANDS



The broad location of the Irish Action Site. Upland peatland in north-west Ireland, including extensive grazing land and Atlantic blanket bog and heath.

WaterLANDS is applying best practice based on lessons learnt from 15 'Knowledge Sites' to wetland restoration in six 'Action Sites' in Ireland, Netherlands, Estonia, Italy, Bulgaria and England. It has 32 partners across Europe.

WaterLANDS is an EU Horizon Innovation Action project that is examining how we can best upscale the restoration of wetlands across Europe. Wetlands can deliver important nature-based solutions that provide for resilience to climate change, most specifically by mitigating extreme events such as coastal storms and sea level rise and down-stream flooding, and by enhancing water quality, sequestering CO2 from the atmosphere and providing refuges for biodiversity. The objective of upscaling is to increase the capacity of natural ecosystems to provide these services. WaterLANDS is one of four complementary projects intended to demonstrate the upscaling of ecosystem restoration and which were supported under the EU Green Deal Call; the other projects being Merlin (rivers), Rest-Coast (coast and river connections) and Superb (forests).

## What is the project about

The six Action Sites where we propose to undertake restoration activity consist of peatlands, marshland and coastal salt marsh. In Ireland, we will be introducing results-based farm payments and supports for the enhancement of peatland where this provides important ecosystem services such as carbon storage, water retention and habitat for biodiversity. The same outputs are anticipated on blanket bog in the north of England and for peatland mire in Estonia. In Bulgaria we will be contributing to the restoration of an important, but much degraded Ramsar wetland. In Venice and the Netherlands we are looking to restore and create salt marsh in combination with the co-benefits of maintaining navigation channels, protection from sea level rise and habitat for biodiversity.

**More information**

Website <https://waterlands.eu>

Contact person Craig Bullock & Shane McGuinness. Mr Paul Chatterton will be representing us in Prague.



Salt marsh and wetland lagoons in the Camargue in southern France.



A map of WaterLANDS Partners and Projects

## Innovative elements of the project

We are proposing to learn from the experiences at the Knowledge sites to implement best practice restoration. We propose to work with the diversity of stakeholders at each Action Site and the wider public to co-create solutions for restoration to ensure that this is both ecologically and socially sustainable and has the support of local communities. We have work packages which are dedicated to providing for stakeholder engagement and to address issues of governance. In addition, we have a work package which has the objective of identifying innovative financial solutions which can supplement public or NGO investment to ensure that restoration can deliver nature-based solutions.



Wetland in the Donana Knowledge Site in southern Spain (PS Camargue is also a Knowledge Site)

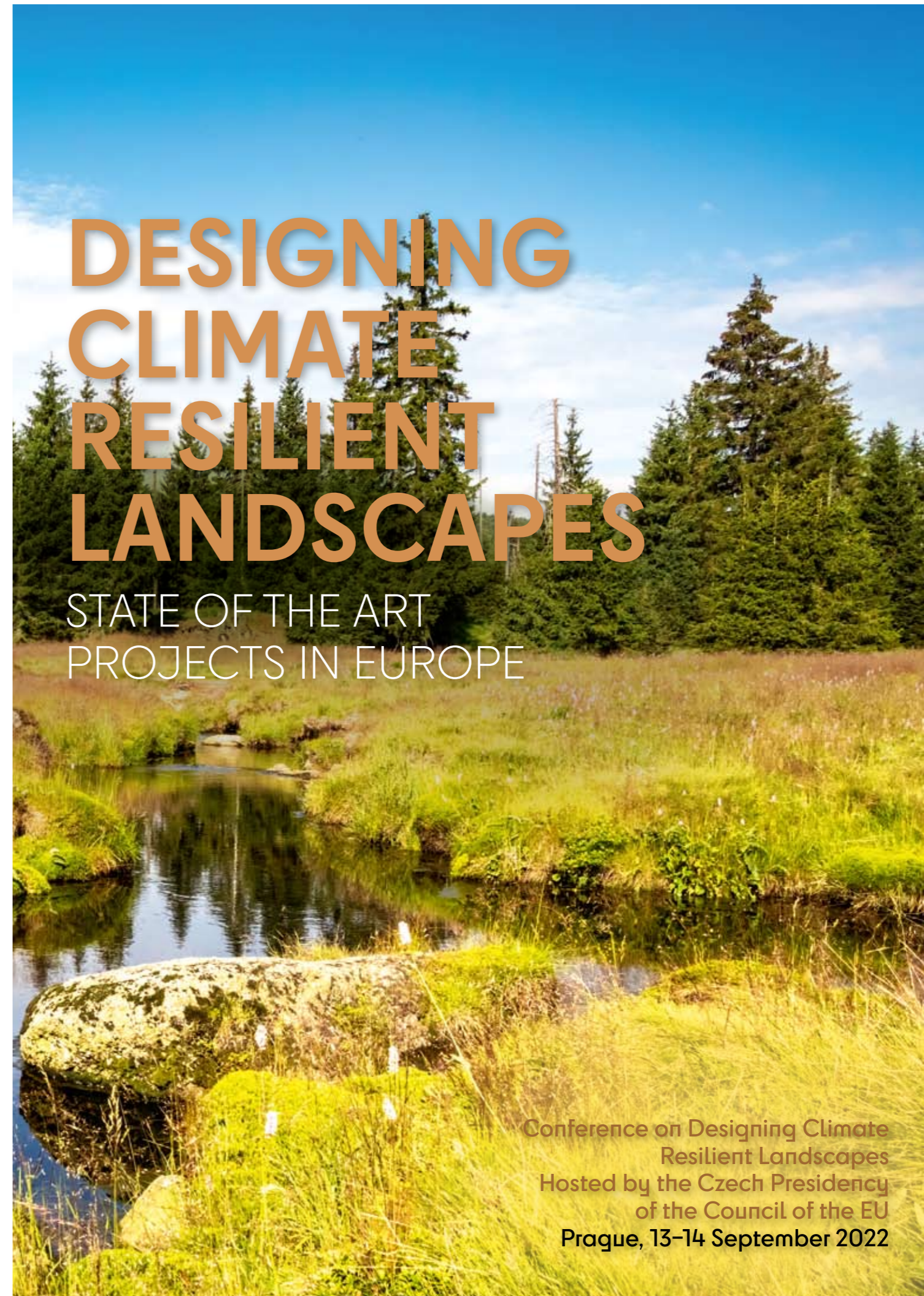
Email address [craig.bullock@ucd.ie](mailto:craig.bullock@ucd.ie), [shane.mcguinness@ucd.ie](mailto:shane.mcguinness@ucd.ie)  
Tel +353 1716 2677



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v Radě Evropské unie

Ministerstvo životního prostředí



# DESIGNING CLIMATE RESILIENT LANDSCAPES

STATE OF THE ART  
PROJECTS IN EUROPE

Conference on Designing Climate  
Resilient Landscapes  
Hosted by the Czech Presidency  
of the Council of the EU  
Prague, 13-14 September 2022