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MITIGATING THE IMPACT OF CLIMATE CHANGE ON WATER

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INTRODUCTION

Climate change is increasingly affecting the availability, distribution, and management of water resources, while the frequency and intensity of extreme hydrological events such as droughts and floods continue to grow. These changes create new challenges for ensuring a reliable water supply, protecting groundwater resources, and maintaining the sustainable use of water in the landscape. Effective adaptation therefore requires not only a detailed understanding of future climate and hydrological conditions, but also a careful assessment of how individual water-management measures perform under different scenarios.

METHODOLOGY

Adaptation Measures Under Evaluation

Landscape and Soil
- Permanent Grassland and Afforestation
- Erosion-control seeding practices
- Infiltration swales
- Wetland habitats
- Rainwater management
- Controlled groundwater recharge

Water Features and Retention
- Retention dikes
- Dry retention basins
- Retention basins with small storage capacity
- Changes to Reservoir Operations
- Protected Areas for Surface Water Accumulation
- Water transfers
- Protection and support of groundwater resources

Watercourses and Forests
- Creation of multifunctional forests
- Revitalization of watercourses in undeveloped areas
- Revitalization of watercourses in built-up areas
- Biomanipulation

ABSTRACT

Key words: water transfers, artificial recharge, groundwater protection, rainwater management, small water reservoirs, climate change, Czechia

The aim of the project was to provide a more detailed and accurate qualitative, temporal, and spatial estimate of climate change and to assess anthropogenic influences. Existing measures were also evaluated, targeted adaptation measures were proposed, and their effectiveness was subsequently assessed. The research focused on evaluating the effectiveness of specific measures depending on future climate scenarios.

The measures assessed included, for example, **water transfers, artificial recharge, groundwater protection, increasing reservoir capacity, water recycling, rainwater management, and promoting water retention in the landscape**.

A key output is a new **multi-criteria analysis methodology that evaluates the benefits of these measures in different hydroclimatic conditions**. The main principle is that the effectiveness of measures is not assessed in general terms, but always in relation to the current regime—i.e., whether the area is facing drought, flooding, or normal conditions. **The same step can have a diametrically different meaning in different situations:** while during drought it is essential to accumulate and strengthen flows, during floods the need to slow down runoff and water infiltration dominates. This approach makes it possible to better ensure future requirements for water abstraction and overall water resource use.

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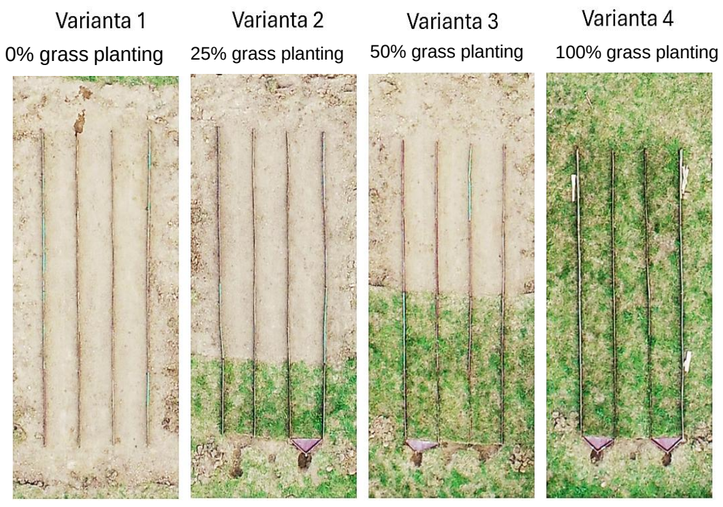
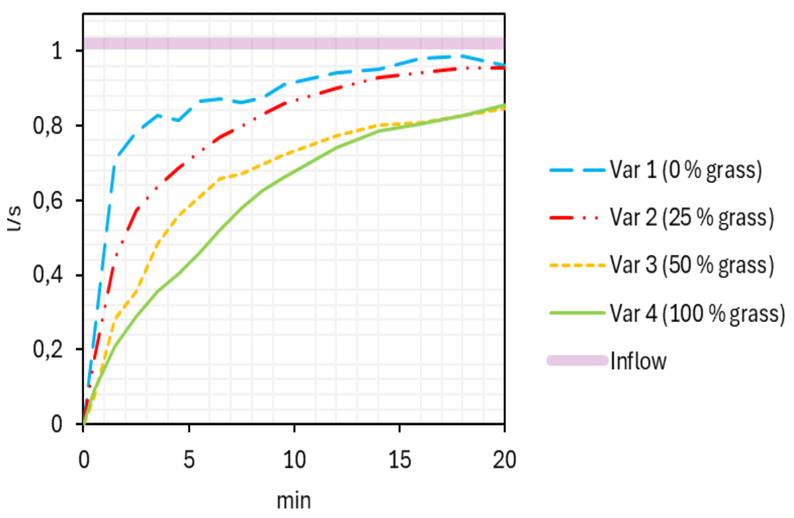
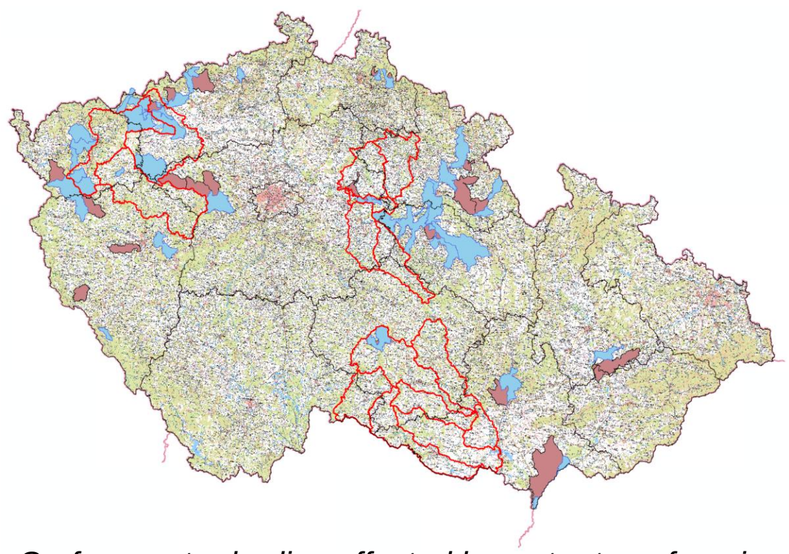


Layout of the experimental plots for variants 1–4 with varying proportions of grass cover. (Photo:T. Laburda)



Trends in average surface runoff across the areas of the individual variants 1–4



Surface water bodies affected by water transfers; in blue: the surface water body from which water is abstracted; in dark red: the surface water body to which water is supplied; in bright red: areas affected by long-term drought

CONCLUSIONS

The project's findings unequivocally confirm that the landscape's ability to retain water, promote its infiltration and mitigate the impacts of climate change is not determined by a single measure or a single component of the landscape.

Water retention arises as the combined effect of interconnected processes taking place in forest stands, agricultural land, wetlands, watercourses, urbanised areas and technical infrastructure.

Effective adaptation to drought and hydrological extremes therefore requires a **multi-level approach combining nature-based and technical measures**.