

## Z-GENERATION AND THOSE BEYOND. HOW SHOULD THEY PERCEIVE DROUGHT ADAPTATION OPTIONS WITHIN ENVIRONMENTAL AND RECREATIONAL EDUCATION?

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### **Abstract**

Z-generation as a first generation of people growing completely in a digital era. Are present climate topics sufficiently attractive to young people? Climate change is one of the major environmental challenges of our time, increasingly visible also in Central Europe. Alongside mitigation and adaptation options to ongoing changes is becoming essential. Environmental education within the Czech EVVO program (Environmental education, upbringing and awareness program) plays a crucial role by building knowledge, attitudes, and skills for responsible action of our society. This paper is trying to analyze how climate change adaptation is reflected in environmental education in Czechia and suggests ways to strengthen its role within the national approach. It focuses on topics such as water management, biodiversity protection, and the adaptation of landscapes and settlements to extreme weather/climate. The study highlights the importance of interdisciplinary cooperation between schools, NGOs, and public administration, as well as the environmental and recreational potential of adaptation measures.

**Key words:** climate change literacy, remote sensing, adaptation potential, educational programmes, environmental education policy

### **Introduction**

Climate change represents one of the most important environmental challenges of our time, which is increasingly evident also in the conditions of Central Europe. In this context, except mitigation measures, the potential for adaptation measures to already ongoing climate change is also gaining its importance. Environmental education, upbringing and awareness-raising within the framework of the EVVO program play a key role in this process, as it contributes to the development of knowledge, attitudes and skills necessary for responsible action by individuals and society as a whole.

The aim of the contribution is to analyze how the topics of adaptation to climate change are reflected and integrated into environmental education in Czechia and to propose options for strengthening their role within the framework educational program. Attention is paid in particular to the topics of water management, biodiversity protection, the adaptation potential of landscapes and settlements to extreme climate features. The study also points to the importance of an interdisciplinary approach and cooperation between educational institutions, the non-profit sector and public administration in developing the adaptation potential of landscapes in the context of ongoing climate change. The important focus was paid to the environmental and recreational potential of chosen adaptation measures.

The contribution also draws attention to the potential of remote sensing methods in teaching geography through the topic of water on Earth from a global, but also a Czech perspective. It deals with the theoretical support of the topic and the setting of the topic in the context of textbooks, selected geoportals and web map services with the possibility of use in teaching geography at both levels of primary school, as well as current approaches within the revised Framework Educational Program from the perspective of geographical objectives and skills or abilities to analyze and interpret geographical data and remote sensing images. The purpose is to point out the interconnectedness of human management in the landscape with natural risks and various geographical phenomena and processes through monitoring changes in water in the landscape.

### **Adaptation measures in Czechia**

In recent years, the Czechia has been systematically developing adaptation measures to respond to the manifestations of climate change, especially the increasing risk of drought. The main goal of these steps is to increase water retention in the landscape, slow down the runoff of rainwater and strengthen the country's overall water security. Coordination is ensured by the Ministry of Agriculture (MZe) and the Ministry of the Environment (MŽP) through the Interdepartmental Commission WATER-DROUGHT

and professional institutions, such as the T. G. Masaryk Water Research Institute in Prague. At the political level, the National Drought Panel operates, which serves as an advisory body to ministers.

### **Strategic framework of the concept**

The basic strategic framework is the Concept of Protection against the Consequences of Drought in the Czech Republic, which is based on five pillars and a set of specific measures. The comprehensive approach is applied primarily in individual river basins, where environmental and technical elements are interconnected so that the measures complement each other. The key objective is to retain as much water as possible in the landscape and slow down its outflow. This is the goal of projects for the construction and reconstruction of water reservoirs, the restoration of extinct ponds and historical waterworks, as well as pilot projects for the artificial infiltration of surface water into rock structures. An important role is also played by the prepared amendment to the Water Act, allowing the declaration of a state of water shortage, and considerations on the constitutional enshrining of the principle that water is the most valuable raw material and a public good. The new anti-erosion decree also introduces the obligation to protect soil on land at risk of erosion and strengthens control of subsidies provided to farmers.

### **Concept pillars**

The first pillar of the concept is the creation of a high-quality information platform for drought monitoring. This is provided primarily by the portals of the Czech Hydrometeorological Institute (CHMI), the „InterSucho“ system, the websites „suchovkrajine.cz“ and „stavsucha.cz“. These information sources serve both experts and the public and help increase society's preparedness for drought.

The second pillar, technical measures, focuses on connecting water supply systems, ensuring a reliable supply of drinking water in dry areas, reducing water losses in pipeline systems and building new dam reservoirs connected to water management systems. Furthermore, the modernization of agricultural irrigation (drip irrigation), the construction of irrigation and fire reservoirs and the use of modern technologies in raw water treatment are supported.

The basis of the third pillar lies in the agricultural sector, where measures focus on increasing soil protection against erosion, using deeper ploughing and breaking up compacted subsoil, as well as supporting crop rotation and growing more resistant varieties. Increasing the content of organic matter in the soil, which binds water better, is also important. Agricultural policy also focuses on returning to sustainable farming, including supporting livestock farming and an ecological approach to the use of biomass.

However, increasing the retention capacity of the landscape (4th pillar) has played a key role in the long term. This includes revitalising watercourses, using the retention potential of river floodplains, building polders and restoring wetlands. Historical ponds and mountain reservoirs (Fig. 1) which were used to retain water in the past, are also somewhere gradually being restored. Modern forestry supports the species diversity of stands and the natural renewal of forests, thereby increasing their resistance to drought. In 2024, as a result of these steps, the retention capacity of the Czech landscape increased by more than 1.8 million cubic meters of water.

The fifth pillar aims at sustainable water management across all sectors. In industry and energy, water recycling and reuse technologies are being introduced, and in households and municipalities, the use of rainwater is being expanded, for example through the “Dešťovka” program. The issue of drought is also reflected in spatial planning — new developments must take into account the water balance of the area. In cities, the emphasis is placed on blue-green infrastructure, i.e. greenery, permeable surfaces, water features and green roofs, which help cool the microclimate.



Fig. 1: Historical photo of one of former accumulation reservoirs used for wood floating from the turn of the 18th and 19th centuries (author unknown).

### **Educational and recreational potential of measures**

Recent outcomes have brought about the urgent need to maintain and strengthen the complexity of the proposed measures. The key outcome for the younger generations, however, is primarily the assurance that current modern technologies, including remote sensing methods, open up significant space for self-realization.

Our research can become one of the possibilities to grasp the issue of landscape transformation from different perspectives through a diverse form of images. It can help grasp the transformation not only of water resources, but also the observation of changes in the landscape in a comprehensive way - using the interpretation and comparison of individual images. Through the search for causes and consequences of processes and phenomena in the landscape, by building a sensitive perception of students. Both hypotheses were confirmed. Most students were not still aware of the issue of remote sensing methods and developed their perspective on this topic through joint teaching. The use of interpretation of images and text, as well as work with a map, contributed to the development of a more sensitive perception of the transformation of the landscape around us in most students and the building of a relationship to the Czech landscape, i.e. the landscape of "home". The students were able to work critically with the map and use it to search for archive images of the selected location.

### **Conclusion**

Tens of billions of crowns are spent on the implementation of adaptation measures in Czechia every year. More than three quarters came from European Union funds. The funding is provided by programs such as the Landscape Care Program, Support for the Restoration of Natural Landscape Functions, the Operational Program Environment, the Rural Development Program, and also the national initiative "We Return Water to the Forest".

The potential of adaptation measures not only against dry periods, but also against frequent flood episodes, can be increased in various ways. One of them is the restoration of former accumulation reservoirs historically used in our border areas for floating wood, or ponds, which were the pride of our country for centuries.

The current strategy of the Czech Republic therefore connects technical, nature-friendly and legislative solutions, which are to be implemented simultaneously and complement each other. The emphasis is placed primarily on long-term adaptation of the landscape, effective management of water resources, and a responsible approach of society to water as a vital and strategically irreplaceable raw material.

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### **Souhrn**

Generace Z jako první generace lidí, kteří kompletně vyrůstají v digitální éře. Jsou současná klimatická témata dostatečně atraktivní pro mladé lidi? Změna klimatu je jednou z hlavních environmentálních výzev naší doby, která je stále více viditelná i ve střední Evropě. Spolu s možnostmi zmírňování a adaptace na probíhající změny se stává nezbytnou. Environmentální vzdělávání v rámci českého programu EVVO (Program environmentální výchovy, vzdělávání a osvěty) hraje klíčovou roli při budování znalostí, postojů a dovedností pro zodpovědné jednání naší společnosti. Tato práce se pokouší analyzovat, jak se adaptace na změnu klimatu odráží v environmentálním vzdělávání v Česku, a navrhuje způsoby, jak posílit její roli v rámci národního přístupu. Zaměřuje se na témata, jako je vodní hospodářství, ochrana biodiverzity a adaptace krajiny a sídel na extrémní počasí/klima. Studie zdůrazňuje význam interdisciplinární spolupráce mezi školami, nevládními organizacemi a veřejnou správou, jakož i environmentální a rekreační potenciál adaptačních opatření.

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