

IDENTIFICATION AND DRONE AERIAL PHOTOGRAPHY OF SELECTED HISTORIC IRRIGATION STRUCTURES IN THE CZECH REPUBLIC

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Abstract

Since the 19th century, the irrigation industry in Bohemia and Moravia has undergone considerable technological development and an increase in irrigated areas. Irrigation has become an important part of the Czech cultural landscape. In the 1990s, however, there was a considerable decline. Complex irrigation systems and buildings have ceased to be used in many cases. They were often destroyed, devastated, left without maintenance. In connection with climate change, drought and uneven distribution of precipitation during the growing season, the issue of irrigation is currently gaining prominence again. In this study, selected historic irrigation structures were documented using a drone - Unmanned Aerial Vehicle (UAV). The aim was to analyze the current state of these buildings in the irrigation industry and to show the true story of these buildings and constructions. These often forgotten buildings and infrastructures with cultural and historical value can be one of the interesting tourist destinations.

Key words: UAV; irrigation; aerial photography; tourist destination

Introduction

Irrigation systems are an important, but until recently neglected, part of the industrial cultural heritage. In general, their importance has been growing, especially in the last decade, in connection with climate change and the increased need to use irrigation. Thus, historical irrigation systems, which originated in the Czech Republic mainly in the second half of the 19th and the beginning of the 20th century and then from the 1960s onwards (Dvořák et al, 2004), gradually came to the forefront of interest. This is in terms of assessing the potential for their renewal, reconstruction, or, conversely, the removal and replacement of a modern functional system. From this point of view and the point of view of the connection to the cultural heritage of the Czech Republic, it is important to identify in time the possible monumental values of these buildings and to define the criteria and possibilities of their monument protection. In this context, it is also important to strengthen the awareness of this type of industrial heritage, both within the professional and lay public (Hudcová, et. al. 2021). The historical context of the administration of hydromelioration structures is part of the publication (Kulhavý, Z., Pelíšek, I. et al., 2017).

Methods and Results

The identification of historic irrigation structures takes place in several steps. This is the identification of specific buildings based on the original project documentation. If this documentation exists, it is stored in archives. Its condition often corresponds to its age and manner of storage over time.

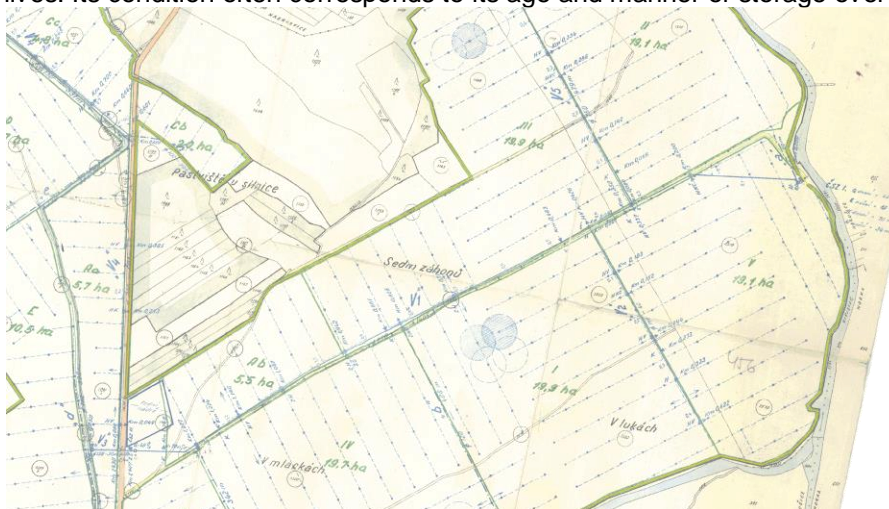


Fig. 1: Sample of historical project documentation of irrigation constructions

Project documentation is then processed in GIS software and stored in a web database. Based on them, specific buildings with cultural and historical value are identified in the field.

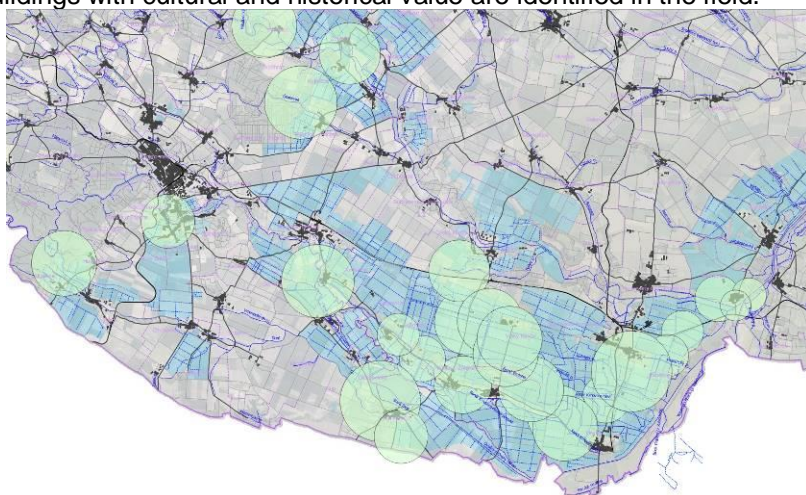


Fig. 2: Example of coverage of the area of interest of irrigation systems of South Moravia drone images (blue color indicates irrigation areas, green circles indicate orientation coverage of drone images)

Sites and irrigation buildings interesting in terms of historical significance and cultural heritage are selected for closer examination. A drone operated at the VUMOP, v.v.i, specifically the DJI Mavic 2 Pro type with a 4k camera and a maximum photo resolution of 5472x3078 pixels.



Fig. 3: Dron DJI Mavic 2 Pro used for photo documentation of sites of irrigation construction

The documentation takes place for irrigation buildings and systems that are still functional and used in operation, as well as buildings and systems that are not functional and often destroyed and abandoned. These are often unused storage water reservoirs, unused water filling stations. At the same time, they are part of our landscape and an important historical example of the irrigation industry in agriculture.



Fig. 4: Functional irrigation equipment on the Křhovice-Hevlín irrigation canal



Fig. 5: Historic aqueduct on the Krhovice-Hevlín irrigation canal



Fig. 6: Water reservoir and water filling station Závlahy Dyjákovice, spol. s r.o.



Fig. 7: Functional irrigation equipment - pivot - Závlahy Dyjákovice, spol. s r.o.



Fig. 8: Non-functional and abandoned irrigation water filling station (Brandýs nad Labem)



Fig. 9: Non-functional and destroyed irrigation water reservoir and water filling station (Rakovník)



Fig. 10: Non-functional irrigation water reservoir (Brandýs nad Labem)

From a detailed survey of a large part of the Czech Republic, it is evident that to this day, some objects or canals are partially preserved. However, a large number of objects are irretrievably damaged and destroyed. The project includes their documentation, condition assessment, and digitization of archival materials.

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Souhrn

Od 19. století prošlo odvětví závlah v Čechách a na Moravě značným technologickým rozvojem a nárůstem zavlažovaných ploch. Závlahy se staly důležitou součástí české kulturní krajiny. V 90. letech však došlo ke značnému útlumu tohoto hospodářského odvětví. Složité závlahové systémy a budovy se v mnoha případech přestaly používat. Často byly zničeny, zdevastovány, ponechány bez údržby. V souvislosti s klimatickými změnami, suchem a nerovnoměrným rozložením srážek během vegetačního období se v současnosti opět dostává do popředí otázka závlah zemědělsky využívaných ploch. V této studii byly vybrané historické zavlažovací stavby zdokumentovány pomocí dronu. Cílem bylo analyzovat současný stav těchto staveb. Tyto často zapomenuté budovy a infrastruktury s kulturní a historickou hodnotou mohou být jedním ze zajímavých turistických cílů.

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