

SMALL RESERVOIRS AS ELEMENTS INCREASING THE ATTRACTIVENESS AND ATTENDANCE OF THE AREA

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Abstract

The issue of climate change, especially drought and water scarcity, has been comprehensively addressed in recent years by several inter-ministerial strategic documents, all of which mention Land consolidation as one of the important and considerable tools for addressing this issue.

Within the framework of land consolidation, it is possible to implement a number of measures that have a positive impact especially on the landscape structure, increase its biodiversity and aesthetics and thus also increase the attractiveness of the area for recreational and sports activities. Building local water management measures is an important part not only of drought prevention and adaptation measures, but also makes it possible to increase the functionality of the area for residents and visitors. One of the examples of building a multi-purpose reservoir is a small reservoir in the cadastre of the village Křepice (district Břeclav). It is a landscape-forming complex of measures -water reservoir with a field road, which will be used, among other things, for recreational purposes as a cycle path, then continuing to the neighbouring area. Velké Němčice. This will not only spread up the network of cycle paths and improve the permeability of the area, but also create a rest and relaxation zone near the reservoir.

Key words: tourism; reservoir; recreation; drought; land consolidation

Introduction

Water fulfills a number of production and non-production functions in the cultural landscape. Because water areas and streams have always been one of the most important landscape elements, they have been significantly influenced by man throughout history. Understanding the main drivers influencing historical changes in the development of water features in the landscape can help to understand and better protect the landscape and the environment. The Czech Republic has been facing a long-term absence of precipitation since about 2015. In recent years, this precipitation deficit has manifested itself almost every year during the spring and summer, when the effect of high temperatures added to the absence of precipitation. These phenomena result in a decrease of water in the landscape. Kvítek (2017) states that water scarcity in the extreme is a global problem. Water retention in the landscape means natural or artificial, temporary retention of water in the landscape. The current world situation (including the Czech Republic) requires that appropriate measures be taken to retain water in the landscape, which will slow down surface runoff and promote water infiltration in the landscape (Lancaster, 2006). The elimination of possible risks can be solved in the process of complex land consolidation, where appropriate measures are implemented within the solution of water management measures during the design of the plan of common facilities (PCF). Measures to catch run-off water and its harmless drainage from surfaces consist mainly of catch ditches or roadway channels. In many cases, field roads designed with ditches within landscaping can serve as a device for interrupting surface runoff and harmless drainage (Papoušek, 2011). Water management facilities, which may also be of landscaping or flood protection, are modifications or revitalization of small watercourses, small reservoirs, wetlands, ponds, dry reservoirs or polders (Němec, Pražáková, 2018). In particular, the design and construction of small reservoirs is currently gaining prominence, with the aim of accumulating and retaining water in the landscape and strengthening its retention capacity.

Materials and methods

For the purposes of this article was selected a locality of Křepice u Hustopečí with ongoing complex land consolidation process. This village is in the Southern Moravia in the Czech Republic.

This village is located north of Hustopeče municipality. The total area of the cadastral area is 671.88 ha. Agricultural land covers a total area of 554.17 ha, the remaining 117.70 ha is non-agricultural land.

In the solved locality there are production and above-average production agricultural lands. The area of interest is shown in Fig. 1.

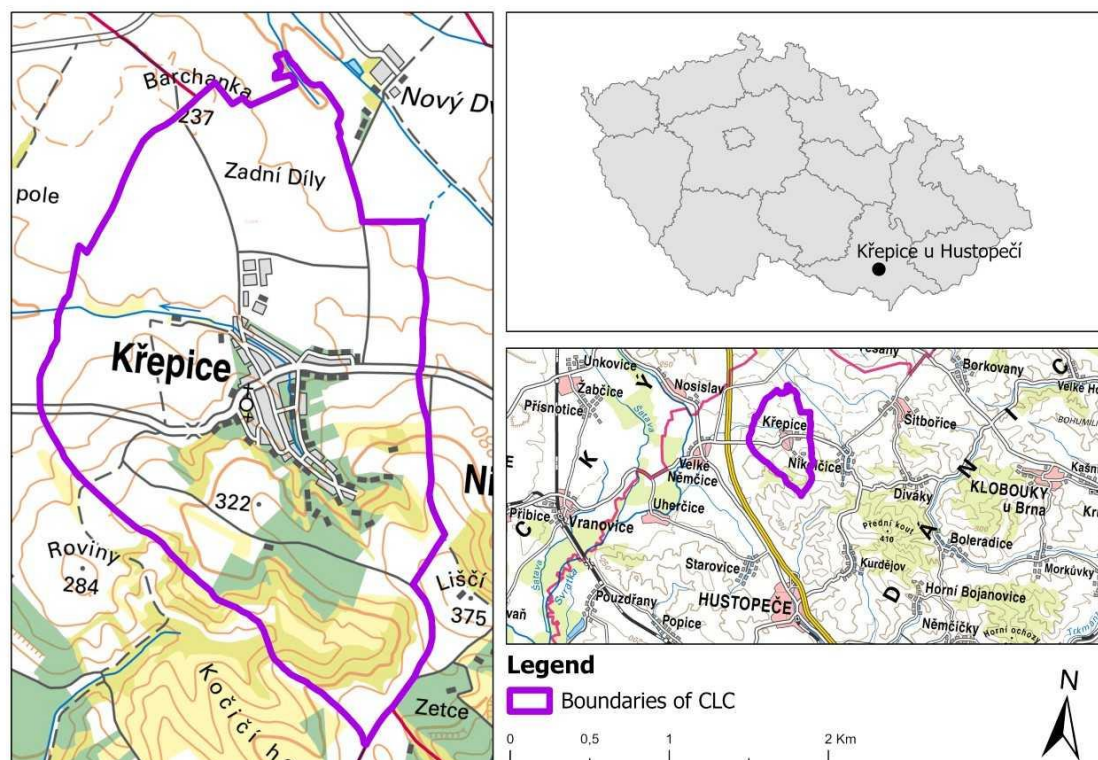


Fig. 1: Area of Křepice

The following measures have been proposed as part of the plan of common land consolidation facilities

- Elements of erosion control – elimination of row crops (171.27 ha), grassing (106.21 ha), technical elements (2x windbreaks, 2x ditch),
- Elements of transport infrastructure – 3x roads to reconstruction, 9x unpaved roads,
- Ecological network – a total 94.70 ha biocentres, biocorridors, interaction elements,
- Water management facilities – water reservoir (Fig.2).

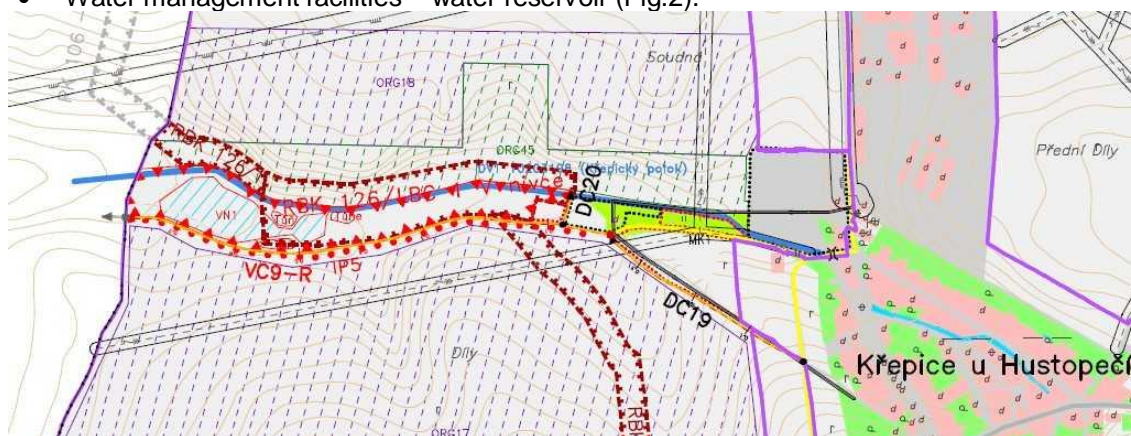


Fig. 2: Part of plan of common facilities with water reservoir

For the purposes of this article, one newly designed water reservoir selected and assessed, which is situated in a wet area around the watercourse.

Results and Discussion

As part of the ongoing land consolidation, small reservoir, including a system of pools, were designed to retain water in the landscape. The water reservoir is located on the right side of the Křepický stream. The proposed reservoir is in the outskirts of the village Křepice near Hustopeče. It is located

northwest of the urban area in the designed local biocentre LBC1. It is a landscaping reservoir that will improve biodiversity and water conditions in the area. The water reservoir is not considered as a dry polder, but as a polder with a fixed water level. The water level can be affected by torrential rain or droughts. A sedimentation space is designed in front of the reservoir itself, which will be used to settle the impurities from the stream. Greening in the form of autochthonous tree species and plants will be designed in the vicinity of the reservoir. (Fig.3)

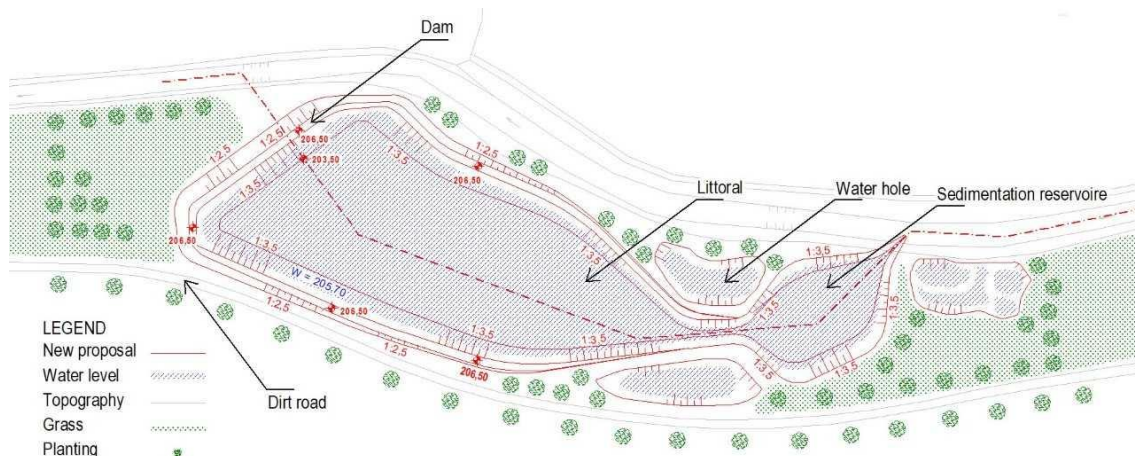


Fig. 3: Situation of designed reservoir

The width of the dam top is designed at 3 m nothoroughable. The elevation of the dam top is 206.5 m above sea level. The slopes were chosen in form 1.3.5 on the upstream side and the air slope was set at 1: 2.5. The water level should be at a height of 205.7 m.a.s. and the maximum water depth should reach 2.2 m. The discovery of water in the reservoir should reach 12,891 m³, the water area will expand to 9,930 m² and the total area of the reservoir, including the accompanying ponds and greenery, will reach 4.5 ha. The design of this water reservoir was prepared based on a topographic and elevation survey of the current state using Atlas DMT design software (Fig.4).

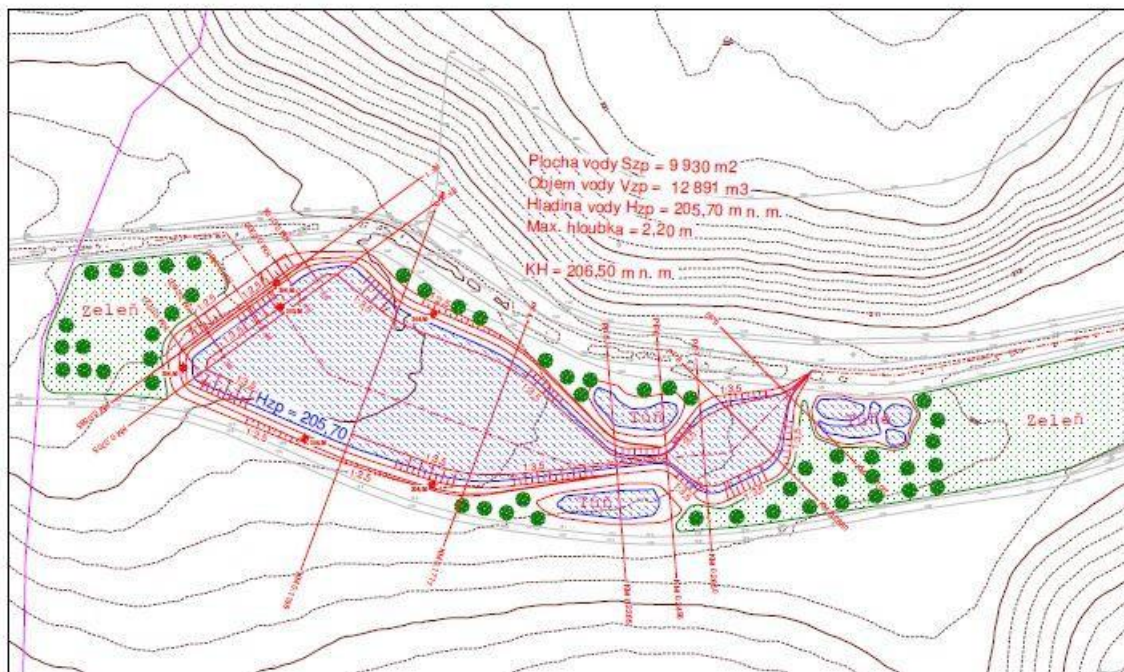


Fig. 4: Project of planned reservoir

A paved road is designed around the water reservoir, which will serve as a bike path to connect the villages of Křepice and Velké Němčice and thus lead bicycle traffic off the main road (Fig. 5).

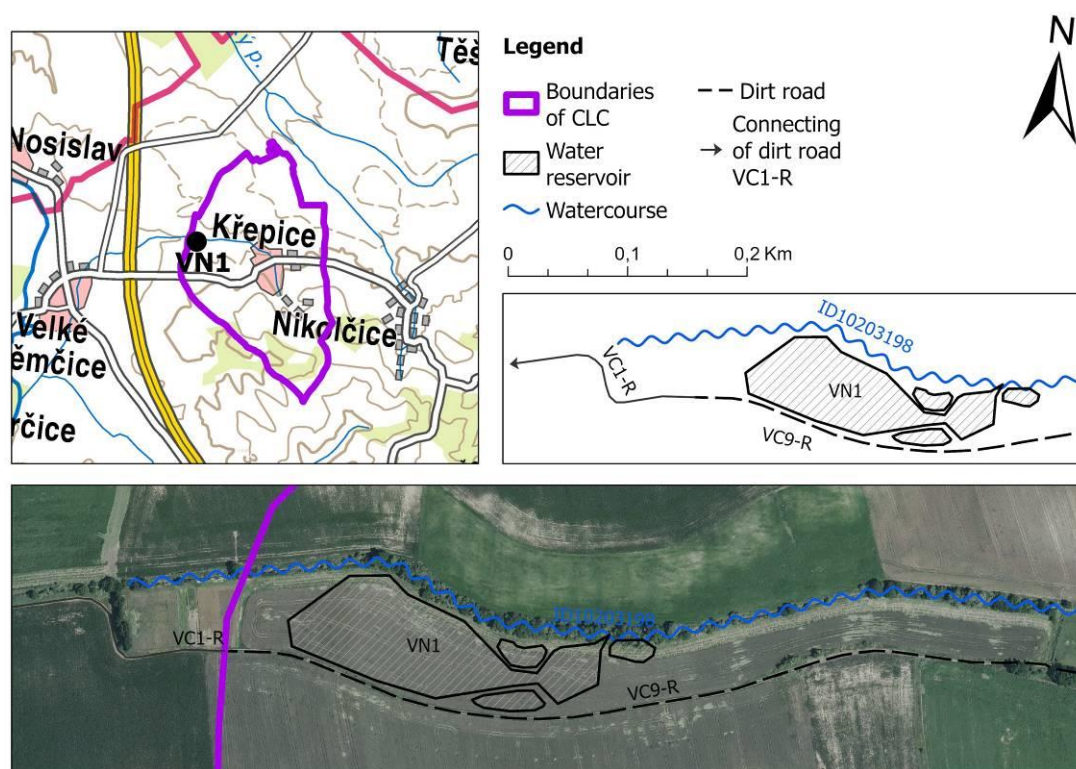


Fig. 5: The bike path around the reservoir and connection to the neighbour area

Conclusion

The village of Křepice lies in a rugged area. Most of the development lies at the foot of steep agricultural slopes with slopes above 10% and in the valley between them. Arable land organized into large land blocks unsuitable for stabilizing the water regime of the locality predominates in the area use of the area. The current situation needs to be supported by a smaller landscape structure, organizational and agrotechnical measures on arable land and a system of technical measures within the framework of land consolidation. Particularly, technical measures can permanently change the character of the landscape. The designed reservoir, accompanied by a system of environmental measures and a sensitively designed road network, will serve locals and visitors as an important place to relax, make walking and cycling more enjoyable between neighboring villages and support tourist development.

References

- Kvítek, T. (2017). ovodně, sucho, eroze, jakost povrchové a podzemní vody, hladiny podzemních vod a společný ukazatel - malá retence vody v krajině [online]. 13. 3. 2017, 1-6 [cit. 2022-04-06]. Dostupné z: https://www.researchgate.net/publication/314860324_Povodne_sucho_eroze_jakost_povrchove_a_p_odzemni_vody_hladiny_podzemnich_vod_a_spolecny_ukazatel_-_mala_retence_vody_v_krajine.
- Lancaster, B. (2006). Rainwater Harvesting for Drylands and Beyond, 1st ed.; Rainsource Press: Tuscon. 404 s.
- Němec, J., Pražanová, L. (2018). Pozemkové úpravy a voda v krajině. In: Rožnovský, J., Litschmann, T. (eds). Hospodaření s vodou v krajině Třeboň 21-22.6.2018. ISBN 978-80-87361-83-2.
- Papoušek, J. (2011). Evaluation of efficiency of the Common Measures-measures for land accessibility, implemented within land consolidation. Agricultural Economics, 57(10), 500-505.

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Souhrn

V rámci pozemkových úprav je možné realizovat řadu opatření, která mají pozitivní dopad zejména na strukturu krajiny, zvyšují její biodiverzitu a estetiku a tím také zvyšují atraktivitu území pro rekreační a

sportovní aktivity. Budování místních vodohospodářských opatření je důležitou součástí nejen prevence sucha a adaptačních opatření, ale umožňuje i zvýšení funkčnosti území pro obyvatele i návštěvníky. Jedním z příkladů výstavby víceúčelové nádrže je malá nádrž v katastru obce Křepice (okres Břeclav). Jedná se o krajinotvorný komplex opatření -vodní nádrž s polní cestou, která bude sloužit mj. k rekreačním účelům jako cyklostezka, dále pokračující do sousedního území. Velké Němčice. Tím dojde nejen k rozšíření sítě cyklostezek a zlepšení prostupnosti území, ale také k vytvoření odpočinkové a relaxační zóny v blízkosti nádrže.

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