

Use and popularisation of historical and current water management sources of information for the development of an environmentally friendly society

Since time immemorial, research in all scientific fields has brought countless new information and broadened the spectrum of current knowledge. In the past, research was made more difficult by the then possibilities of disseminating newly acquired knowledge. Many scientists in the world have asked the same questions, proposed and tested similar hypotheses, obtained similar scientific results, and reached their own unique conclusions. The problem was the very limited possibility of sharing this new information, thus the possibility of their mutual use and very often their preservation and availability to future generations. It is safe to say that in the history of science, a huge amount of knowledge and information was discovered that was not used enough, was discovered repeatedly, or was completely lost.

The present time brings countless possibilities and tools for collecting preserved historical data and using them in the context of today's findings. The collaboration of experts from various scientific fields with historians proves to be very beneficial; they can find their way around archives, search them, and make historical documents from various fields of science available for new processing and use. Another great benefit is the possibility of digitization and advanced technical processing of historical findings, and thus preserving it for future generations.

These activities are supported by the projects of the Programme for the Support of applied Research and Experimental Development of National and Cultural Identity (NAKI and NAKI II), announced by the Ministry of Culture. Since 2012, the TGM WRI employees have been intensively using this project programme to make available and re-use historical water management information and to compare it with current knowledge.

In the *Long-term conceptual development of a research organisation* ("LCDRO") for 2018-2022, which is based on the *Methodology for Evaluating Research Organizations and Research, Development and Innovation Purpose-tied Aid Programmes (Methodology 17+)*, approved by *Resolution of the Government of the Czech Republic No. 107/2017, on the Methodology for Evaluating Research Organizations and Research, Development and Innovation Purpose-tied Aid Programmes*, since 2018, the research task RT11 "*Use and popularisation of historical and current water management sources of information for the development of an environmentally friendly society*" has been included.

This part of LCDRO, with the contribution of purpose-tied institutional funds, supports research and the dissemination of knowledge, which in the area of RT11 represents the use of historical resources and experience in accordance with the theme of area 5 (Environmentally friendly society) of the Research and Development Concept of the Ministry of the Environment for 2016–2025.

The research task is mainly linked to projects implemented under the NAKI programme, focused on water management topics from a historical perspective and activities within their implementation after their completion (*Tab. 1*).

The projects are oriented towards research and processing of historical sources of information with the aim of assessing the state and effect of changes on environmental components, natural resources, landscape, and people. The most valuable contribution of these projects is the search, registration, and inventory of available documents related to the topic. In addition to books and other written materials, other sources of information include historical maps, photographs,

archival materials, works of art, and personal experience from contemporary witness. Information from historical sources is processed and presented in classic and modern forms of output so that they are accessible for further use and presentation to interested professionals and the lay public. In addition to professional outputs, project results are made available in the form of popular science books, interactive maps, web applications, educational programmes, and public databases. The results of the projects are presented to the public through web-sites, exhibitions, workshops, seminars, conferences, media reports, etc.

RESEARCH TASK RT11 IS CURRENTLY DIVIDED INTO THREE SUB-OBJECTIVES:

DC11-1 Research and processing of historical sources of information in the field of water supply and management

Within sub-objective DC11-1, research and processing of historical sources of information is carried out in the areas of water supply and management, water treatment for the needs of settlements and industry, water supply, water purification, and historical development of water management.

This part is supported by the ongoing project "*Water towers – identification, documentation, presentation, new utilization*" within the NAKI II programme and the implementation of the project "*Possibilities of water recreation within the capital city of Prague (from history to the present)*", the completed project "*Recreational potential of water in Prague – status and perspectives*" within the Operational Programme Prague – Growth Pole of the Czech Republic, and "*Documentation, passportization, archiving and proposal of chimney reservoir converting as an endangered group of heritage of industrial monuments in the Czech Republic*", implemented in 2013–2015 within the NAKI programme.

DC11-2 Research and processing of historical sources of information in the field of water management in the landscape

Within sub-objective DC11-2, research and processing of historical sources of information in the areas of water management in the landscape, the impacts of significant water management changes on further development (construction of water works, water management treatment of watercourses, extreme climatic phenomena, sources of pollution, etc.), and historical development of water treatment.

The sub-objective is supported by the ongoing projects "*Historical water management objects, their value, function and significance for the present*" and "*Irrigations – rediscovered heritage, their documentation and popularization*", implemented within the NAKI II programme, and the implementation of the completed projects "*Non-invasive and economical techniques of water elements*

environment quality and maintenance solution in the frame of historical monuments care" (NAKI) and "Assesment of agricultural land in the areas of extinct fishpond systems with the aim of supporting sustainable management of water and soil resources in the Czech Republic" (KUS Programme of the Ministry of agriculture).

In the years 2012–2016, the combination of historical water management topics was addressed in the projects of the NAKI programme "Identification of significant areas with cultural and historical values threatened by natural and anthropogenic stresses" and "Submerged villages – the lost cultural and natural heritage of the South Moravia" (Tab. 1).

DC11-3 Environmental education and promotion of water management issues with the aim of creating an environmentally friendly society

Sub-objective DC11-3 is focused on current trends in the transmission of information to the public, awareness of professional activities in the field of water management, inclusion of the professional and lay public in environmental education, training and awareness (environmentální vzdělávání, výchova a osvěta, EVVO) and environmental consultancy (environmentální poradenství, EP), streamlining the presentation of environmental protection in the media, and expansion of the portfolio of contacts and presentation possibilities. Activities are carried out in cooperation with the TGM WRI PR department by publishing popularization articles and promoting project results in the VTEI journal, on web and Facebook pages, and in the media.

As part of the activities of LCDRO "Use and popularisation of historical and current water management sources of information for the development of an environmentally friendly society", a number of professional outputs were created which were presented to the professional public in the form of professional articles and presentations at scientific conferences and seminars and processed into methodologies. These outputs contribute to better results of TGM WRI in the evaluation of research organizations and the related allocation of purpose-tied research support.

Other activities are aimed at popularizing interesting historical and contemporary water management topics. For this purpose, both within the projects and other activities of TGM WRI, popular-scientific types of outputs are created. Below is a selection of them:

Popular scientific and professional books

- PAVELKOVÁ, R., FRAJER, J., NETOPI, P. et al. *Historické rybníky České republiky: srovnání současnosti se stavem v 2. polovině 19. století*. Prague 2014, 167 p.
- ROZKOŠNÝ, M. et al. *Zaniklé rybníky v České republice – případové studie potenciálního využití území*. Prague 2015, 170 p.
- MLEJNKOVÁ, H. et al. *Zatopené kulturní a přírodní dědictví jižní Moravy*. Brno 2016, 263 p. Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=pdf/kniha_zatopene_dedictvi.pdf
- *Zatopené kulturní a přírodní dědictví jižní Moravy exhibition catalogue*. Prague 2016, 210 p. Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=pdf/katalog_vystavy.pdf
- ROZKOŠNÝ, M. et al. *Kvalita prostředí vodních prvků kulturních památek a historických sídel. Posouzení stavu a možnosti řízení kvality v rámci památkové péče*. Prague 2019, 120 p. Available at: <https://heis.vuv.cz/projekty/vodniprvky>
- KULT A. et al. *1919–2019. Sto let činnosti Výzkumného ústavu vodohospodářského od jeho založení v roce 1919: Historie v datech*. Prague 2020, 405 p;
- *1919–2019. 100 let činnosti Výzkumného ústavu vodohospodářského: Historie ve fotografiích*. Prague 2020, 110 p.
- VONKA, M., KOŘÍNEK, R., HOŘICKÁ, J., PUSTĚJOVSKÝ, J. *Komínové vodojemy: situace, hodnoty, možnosti*. Prague 2015, 127 p.

- VONKA, M., KOŘÍNEK, R. *Komínové vodojemy. Funkce, konstrukce, architektura*. Prague 2015, 103 p.

Specialized maps and map files

- *Současný stav historických rybníků na území České republiky, 2013*. Available at: <https://heis.vuv.cz/projekty/historickerybniky>
- *Současné půdní poměry na plochách zaniklých rybníků v okresech Pardubice a Jindřichův Hradec, 2015*.
- *Změny využití krajiny v zázemí vodní nádrže Vranov, 2016*. Available from: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=mapy/Vranov_mapa%20vyuziti%20krajiny.pdf
- *Změny využití krajiny v zázemí vodní nádrže Brno, 2016*. Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=mapy/Brno_mapa%20vyuziti%20krajiny.pdf
- *Změny využití krajiny v zázemí vodního díla Nové Mlýny, 2016*. Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=mapy/Nove_Mlyny_mapa%20vyuziti%20krajiny.pdf
- *Vliv změny využití krajiny na ohroženost půdy vodní erozí v zázemí vodního díla Nové Mlýny, 2016*. Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=mapy/Mapa_vliv_krajiny_na_erozi.pdf
- *Archeologické lokality pod hladinou Vodního díla Nové Mlýny, 2016*. Available at: https://heis.vuv.cz/data/webmap/datovesady/projekty/zatopenededictvi/mapy/mapa_archo.pdf
- *Historické vodohospodářské objekty v povodí Svitavy, 2020*. Available at: <https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=svitava>
- *Možnosti vodní rekreace na území hlavního města Prahy (od historie po současnost), 2020*. Available at: <https://heis.vuv.cz/projekty/praha-rekreace?t=aktivita&t2=vysledky>
- *Historické vodohospodářské objekty v povodí horní Moravy, 2021*. Available at: https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=horni_morava
- *Historické vodohospodářské objekty v povodí Moravice, 2021*. Available at: <https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=moravice>
- *Historické vodohospodářské objekty v povodí Ploučnice, 2022*. Available at: <https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=ploucnice>
- *Historické vodohospodářské objekty v povodí Doubravy a horní Klejnárky (Čáslavsko), 2022*. Available at: <https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=caslavsko>

Workshops, conferences, and exhibitions

- *Zatopené kulturní a přírodní dědictví jižní Moravy, 2016* – mobile exhibition.
- *Povodně a sucho v zatopených obcích jižní Moravy, jak je zachytily dobové kroniky, fotografie a vyprávění, 2016* – educational event.
- *Památky ohrožené přírodními a antropogenními vlivy, 2018* – Brno, professional seminar.
- *Rybníky 2018* – Prague, cooperation with organizing the conference.
- *Věžové vodojemy v pozadí, 2018* – workshop.
- *Historie plavebního kanálu Dunaj-Odra-Labe, 2019* – Brno, workshop.
- *Věžové vodojemy, 2019* – Prague, conference.
- *Národní dialog o vodě, 2019* – Nové Město na Moravě, meeting of the water management public and representatives of the state administration and local government.
- *Praktické poznatky a doporučení k péči a údržbě vodních prvků památkově chráněných lokalit, 2019* – Kroměříž, professional seminar.
- *Extrémní hydrologické jevy ve vztahu k ochraně památek, 2018* – educational seminar.

Tab. 1. Projects focused on the processing of historical water management sources of information

Time period	Principal investigator	Project identifier	Programme	Project title	Project aims
2012–2015	FOREJTNÍKOVÁ, Milena	DF12P01OVV035	NAKI 2011 till 2017 (MK)	<i>"Identification of significant areas with cultural and historical values threatened by natural and anthropogenic stresses"</i>	As part of the project, the degree of potential threat to selected categories of monuments (national cultural monuments and world cultural heritage monuments) and protected areas (urban heritage reserves, village heritage reserves, archaeological heritage reserves, and other heritage reserves) by significant natural, industrial, and agricultural risks was evaluated with a uniform procedure for the entire Czech Republic.
2012–2015	ROZKOŠNÝ, Miloš	QJ1220233	KUS 2012 till 2018 (MZE)	<i>"Assesment of agricultural land in the areas of extinct fishpond systems with the aim of supporting sustainable management of water and soil resources in the Czech Republic"</i>	As part of the project, an inventory of the areas of former pond systems (water bodies), and an assessment of the current landscape in these areas was carried out, and changes to strengthen the sustainable management of water and soil resources were proposed.
2013–2015	KOŘÍNEK, Robert	DF13P01OVV021	NAKI 2011 till 2017 (MK)	<i>"Documentation, pasportization, archiving and proposal of chimney reservoir converting as an endangered group of heritage of industrial monuments in the Czech Republic"</i>	As part of the project, the location of existing chimney water towers in the Czech Republic and their construction historical survey was carried out, construction documentation/passporting of the objects was created, original and current image documentation was collected, and proposals for the reconstruction and conversion of existing chimney water towers were created both from the point of view of the original purpose and a completely new use.
2013–2016	MLEJNKOVÁ, Hana	DF13P01OVV012	NAKI 2011 till 2017 (MK)	<i>"Submerged villages – the lost cultural and natural heritage of the South Moravia"</i>	The project evaluated the historical, socio-cultural, and ecological continuity of the area, which was completely changed by water management adjustments, and compared the state of society, culture, landscape, water-courses, water bodies, and their use, habitats, and other components shaping the cultural and natural heritage of South Moravia, before and after the flooding of large areas during the construction of water reservoirs – Nové Mlýny, Vranov Reservoir, and Brno Reservoir.
2016–2019	ROZKOŠNÝ, Miloš	DG16P02M032	NAKI II 2016 till 2022 (MK)	<i>"Non-invasive and economical techniques of water elements environment quality and maintenance solution in the frame of historical monuments care"</i>	The project was aimed at verifying environmentally friendly and non-invasive technologies for maintaining or improving the quality of the aquatic environment and reducing the amount and dangerous properties of the bottom sediment of reservoirs in the area of cultural monuments and historical settlements.
2018–2020	MLEJNKOVÁ, Hana	UH0382	Operační program Praha – pól růstu ČR	<i>"Recreational potential of water in Prague – status and perspectives"</i>	The project aim was to evaluate the development of water recreation in Prague from the end of the 19 th century to the present day and to map the recreational potential of current and future bathing locations in Prague. The subject of the research was the evaluation of current possibilities (including advantages and limitations) for water recreation and the mapping of other, so far unused water bodies with the aim of determining the potential of their use and assessing the current water quality and the possibilities of improving their condition.

Time period	Principal investigator	Project identifier	Program	Project title	Project aims
2018–2022	KOŘÍNEK, Robert	DG18P02OVV010	NAKI II 2016 till 2022 (MK)	"Water towers – identification, documentation, presentation, new utilization"	The project aim is the identification and registration of water towers, their documentation, determination of their value and comprehensive processing of the historical, structural, technological, and architectural development of these buildings in our country. Furthermore, the project deals with proposals for new uses for them, especially in the form of conversions.
2018–2022	DZURÁKOVÁ, Miriam	DG18P02OVV019	NAKI II 2016 till 2022 (MK)	"Historical water management objects, their value, function and significance for the present"	The project aim is to contribute to the knowledge, systematic documentation, and setting of objective evaluation criteria for a specific group of technical monuments from the category "historical water management structures". As part of the project, a methodology for unambiguous identification, classification, evaluation in terms of monument preservation, protection, and restoration of historical water management objects is created through criteria established on the basis of an interdisciplinary approach.
2020–2022	ROZKOŠNÝ, Miloš	DG20P02OVV015	NAKI II 2016 till 2022 (MK)	"Irrigations – rediscovered heritage, their documentation and popularization"	The project aims to document comprehensively and in detail and popularize the history of irrigation and part of the industry associated with its implementation and production of soil irrigation equipment as specific sectors of water management and industrial heritage.

- *Danube Day*, 2018–2022 – regular educational event.
- *TGM WRI Open Day* 2018–2022 – regular educational event.
- *Mobile exhibition on the occasion of the 100th anniversary of the founding of the TGM WRI*, 2019.
- *Konverze věžových vodojemů*, 2021 – Prague, exhibition.

Web and Facebook pages

- *Flooded cultural and natural heritage of South Moravia*: <https://heis.vuv.cz/projekty/zatopene-dedictvi>
<https://www.facebook.com/zatopenededictvi>
- *Possibilities for water recreation within the capital city of Prague (from history to the present)*: <https://heis.vuv.cz/projekty/vezovevodojemy>
<https://www.facebook.com/plovarynp Praha>
- *Water towers*: <https://heis.vuv.cz/projekty/vezovevodojemy>, www.vezovevodojemy.cz, <https://www.facebook.com/VezoveVodojemy>

Web applications

- *Evaluation of areas on former pond systems (water bodies) with the aim of strengthening sustainable management of water and soil resources in the Czech Republic*. Interactive application. Available at: <https://heis.vuv.cz/projekty/historickerybniky>

- *Non-invasive and environmentally friendly procedures for solving the environmental quality and maintenance of water features within monument preservation*. Web presentation of the project. Available at: <https://heis.vuv.cz/projekty/zavlahy>
- *Interaction of extreme hydrological phenomena with listed objects*. Web application.
- *Possibilities of water recreation within the capital city of Prague (from history to the present)*. Web map application. Available at: <http://www.dibavod.cz/vodni-rekreace-praha>
- *Irrigation – rediscovered heritage, its documentation, and popularization*. Web application of the project, database of selected locations of irrigation systems and buildings. Available at: <https://heis.vuv.cz/projekty/zavlahy>
- *Historical water management objects, their value, function, and significance for the present time*. Project web application. Available at: <https://heis.vuv.cz/data/webmap/datovesady/projekty/vhobjekty/>
- *Threats to listed buildings from external influences*. Web map presentation. Available at: <https://heis.vuv.cz/data/webmap/datovesady/projekty/ohrozenepamatky/default.asp>

Databases

- *Database of water towers*. Available at: <http://www.vezovevodojemy.cz/?action=diesel.list&table=vodojemy>
- *Flooded Cultural and Natural Heritage of South Moravia Database*. Available at: <https://heis.vuv.cz/projekty/zatopene-dedictvi?t=dtb>

- *Possibilities for water recreation within the capital city of Prague (from history to the present) database.* Available at: <https://heis.vuv.cz/data/webmap/datovesady/projekty/polrustu2rekreace/default.asp?lang=&tab=4&tab2=6&wmap=>
- *Database of selected irrigation systems and objects.* Available at: <https://meliorace.vumop.cz/zavlahy/popularizace/databazi.html>
- *Database of mapped historical water management objects of the Czech Republic.* Available at: <https://heis.vuv.cz/data/webmap/datovesady/projekty/vhobjekty/default.asp?lang=&tab=2&tab2=7&wmap=>
- *Database of historical water management objects in selected river basins of the Czech Republic.* Available at: <https://heis.vuv.cz/projekty/vh-objekty?t=vystupy&t2=databazep>

Educational material

- *“Jak se žilo v Bítově a Kníničkách, než zmizely pod hladinami přehradních nádrží?” (How was life in Bítov and Kníničky before they disappeared under the dam reservoirs?)* Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=educ/zivot_v_obcich_pred_zatopenim.pdf
- *“Procházka starým Bítovem”. (A walk through old Bítov).* Available at: https://heis.vuv.cz/projekty/zatopene-dedictvi?s=educ/prochazka_starym_bitovem.mp4
- *Virtual tour of Cornštejn under Bítov.* Available at: <https://www.youtube.com/watch?v=VflxM7j8ZjM>
- *Atlas of biot threats (created to support the methodology of Identification of important areas with cultural-historical values threatened by natural and anthropogenic influences).*

The research projects and other activities focused on historical topics showed the importance of historical data which are often neglected, especially due to their poor availability. The study of this type of information sources often requires the cooperation of historians and archive workers, and also mutual helpfulness and cooperation between professional institutions or state enterprises and private companies that have their own professional archives. Equally important is the benefit of working with contemporary witness and preserving their memories, as well as private documents and archives, including photographic ones. A specific feature of a number of water management systems, works, and objects is their continuous modernization and reconstruction with the aim of ensuring the fulfilment of current social needs and requirements. For these reasons as well, it is important to be able to preserve, or at least document, their condition and equipment – including instrumentation – during different periods of their operation. It is therefore very worthwhile to dedicate oneself to such research, and thus save a lot of useful and often irreplaceable information for future generations.

Acknowledgements

The article was created with the support of the Long-term conceptual development of a research organisation (“LCDRO”) and projects of the NAKI II programme DG18P02OVV010 “Water towers– identification, documentation, presentation, new utilization”, DG18P02OVV019 “Historical water management objects, their value, function and significance for the present”, and DG20P02OVV015 “Irrigations – rediscovered heritage, their documentation and popularization”.

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