Historical Water Management Constructions, their Value, Function and Significance

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Abstract. The contribution would like to present a new research project focused on expansion of the knowledge, systematic documentation and definition of objective criteria for the evaluation of a specific group of technical monuments – historical water management constructions. The main goal is to develop a methodology of unambiguous identification, categorization and evaluation of historical water management objects in terms of historic preservation and renewal, based on an interdisciplinary approach. Attainment of the project’s goals through:

- documentation and analysis of the water management objects' evolution in chosen study areas, using historical topographical maps of five different periods, as well as archive sources,
- comparative analysis of the historical water management objects' development in study areas, taking into consideration different conditions both natural and socio-economic

The project’s outcomes will be:

- a set of maps,
- the methodology of identification, categorization and evaluation of historical water management objects. The methodology will be a significant contribution to further research activities involving documentation, evaluation, preservation and renewal of this specific cultural heritage fund.

1. Introduction

The main aim of the project is to create guidelines for evaluation of historical water management constructions. The project emerged from need of tool that can be used for proper identification, systematic documentation and setting objective criteria for evaluation of technical cultural heritage – especially of water management constructions. Systematic documentation of technical cultural heritage in Czech Republic is underway within purview of National Heritage Institute since 90s of 20 century. There has been done general mapping of areas and their industry sectors and nowadays there is a project for guidelines for evaluation and protection of technical cultural heritage in general. It is planned that each sector (transportation, textile metallurgy, food processing etc.) will be then elaborated in detail.

There have been already done some one-off studies in field of water management. Water management constructions were analysed in connection with development and decline of some industry sectors (e.g. elimination of water areas in relation to sugar industry; [1]). Importance of extant water management constructions, functional historical pond systems or dam relics is taken into
account in historical landscape protection. There is a database of historical water areas that should be broadened to other constructions [2] [3].

Nevertheless industrial heritage is so far mainly seen from architectural point of view as a construction and its possibilities for use and conversions but documentation and evaluation of industrial heritage is far more specific. Sometimes more important is technology that has been used, connection with historical events, previous forms of management and its influence on landscaping. There is vast need of interdisciplinary approach. This is the reason why for this project there has been established large consortium from five institutions of different specialization: TGM Water Research Institute, p.r.i., National Heritage Institute, The Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Palacky University Olomouc and The Institute of History of the Czech Academy of Science.

2. Guidelines for evaluation

Nowadays there are Guidelines for Evaluation of Industrial Heritage from point of view of heritage care prepared for certification [4], which represent general tool how to approach documentation, evaluation, preservation and reuse of industrial heritage in regard of its historical and cultural value.

Methodical procedure in form of certified guidelines, which is going to be output of this project will arise from above mentioned general methodology [4] and will represent specialized guidelines focused on water management constructions. It is going to point out specifics of different types of water management constructions that are necessary to identify, document and protect. Within this output new terminology related to studied types of constructions will be put together. Also new structured classification of water management constructions will be designed that will find its use in Heritage catalogue provided by National Heritage Institute. Recently there are these elementary levels of classification proposed for the project use:

- Water supply (drinking water sources, water collection and treatment, drinking water supply)
- Sewerage and wastewater treatment
- Watercourses (watercourse’s objects and watercourse adjustments, flood protection measures)
- Weirs
- Waterways
- Water power plants
- Dams
- Small water reservoirs
- Irrigation

Need of interdisciplinary approach towards evaluation of industrial heritage is mentioned by many authors [5], [6], [7], [8]. They are nowadays evaluated mainly by traditionally understood architectural, urbanistic or art-historical criteria. Professional public dealing with this type of heritage is aware that the value is also in its technical and technological solution, authenticity, functional continuity, linkage with important historical events (e.g. [9]), with historical way of farming, but also in co-creation of landscape values (e.g. [10]).

Important part of the project it to suggest suitable set of criteria for evaluation that will capture well specifics of water management constructions. For these objects is also typical that they are in use and have their value as part of some bigger functional unit.

It is important for evaluation of significance to define key technical and technological approaches during constructing all considered types of water management objects and its infrastructure. Authors of publication about dams in Czech Republic [11] state that list of protected dams is unbalanced, there are missing those with special position in development of the field. Aim of the project is to suggest criteria for evaluation of water management constructions so that specifics of industrial heritage would be more taken into account. Main categories of evaluation criteria are:
• Technical (structural) exceptionality
• Technological exceptionality
• Functional continuity, part of functional unit
• Co-creation of landscape values
• Influence on society development
• Architectural value

Figure 1. 1st Březová water main – collecting objects: a) the entrance portal and its architectural value, b) functional technological solution of collection objects from the early 20th century. Photo: TGM WRI, 2018

There have been five pilot sites chosen to set up correctly evaluating criteria and test suggested methodical directions:

• the lower Svitava River basin
• the Čáslav region,
• the Česká Lípa region,
• the selected parts of the upper Morava River basin,
• the Moravice River basin.

Pilot sites were chosen in the way that development of different kinds of water management constructions would be covered and comparative analysis of formation, termination and change of use and their reason could be done. Listed regions were chosen according to those criteria:

• different prevailing form of farming in evaluated areas,
• different socio-economic conditions,
• different physically geographical conditions,
• different administrative historical development.

3. Survey and research of water management facilities in pilot areas
The main objective of the research of water management facilities in pilot areas is setting and verification of general, uniform and effective methodical procedures for documentation, analysis and evaluation of water management facilities from the point of view of monument care in the Czech Republic. The assessment of water management facilities is based on the proposed set of assessment criteria specified in the previous chapter.

In the pilot areas, field identification of water management facilities is carried out using additional information sources from archives, from detailed mapping of the Stable Cadastre and other supplementary map sources. Field surveys are focused on documenting objects, evaluating their status and current use.
Attention is also focused on the analysis of natural conditions in the area (river basin), i.e. description and reconstruction of the historical hydrographic (river) network, incl. small water reservoirs/ponds and the analysis of the development of the land use and landscape use in individual time periods, the development of settlements (extinct villages), ownership relations, driving forces and their development in the territory. In parallel, the analysis of available technical documentation and the subsequent assessment of water management facilities from the point of view of water management technologies used.

The subject of interest is mainly water management works related to energy (drives and weir, connected first production plants – mills, washboards, etc., that often served as a basis for the construction of manufacturing enterprises of industrial type), transport (from small water reservoirs for timber transport from mountain areas to structures making waterways navigable – construction of artificial canals and dams) and with other functions (drinking water, flood protection measures) – waterworks, water towers, water mains, waste water treatment plants, dams, dam systems, etc.

In order to obtain relevant information enabling a methodical procedure for the evaluation of historical water management facilities, it will be necessary to carry out selective and global surface (by model areas) search, analysis and interpretation of available archive funds. Archival sources related to modern water management structures of various typologies and general water management activities are located in central archives for both Czech and foreign archives (mainly the Allgemeines Verwaltungsarchiv and the Finanz- und Hofkammerarchiv in Vienna for the period until 1918) and domestic (National Archives in Prague, Moravian Land Archives in Brno, the Silesian Archives in Opava), in regional and district archives or other memory institutions (museums, galleries, archives of professional institutions, etc.). Key sources of higher level include the funds of central (decision-making) institutions (e.g. the state authority, the governor's office, the gubernium, the regional authorities, the judicial and financial authorities of all courts, the building authorities, etc.), manor funds (of manor farm estates), generic, familial and institutional (e.g. ecclesiastical) archives, archives of water management cooperatives, societies, branch societies, etc., municipal funds and outputs of cadastral survey measurements. Apart from archival materials, it will be necessary to carry out a search of special statistics, topographies and schematics, as well as thematically, methodologically and disciplinarily differently oriented secondary literature.

A synthesis of the findings from the evaluation in pilot areas will be a set of maps of historical water management facilities, their development in the given territory, with an assessment of their importance, status and use.

4. Research of water management facilities in the lower Svitava River basin

As part of the solution of the problem in the pilot area of the lower Svitava River basin, a number of field surveys were carried out in selected parts of the river basins, where the situation was monitored and at the same time confronted with the findings found in historical searches. The node location is the town of Letovice, located directly on the Svitava River. The location with its surroundings offers a varied typological set of WM facilities, which together form a connected and mutually influencing unit (five mills in Letovice, drives, water connections of the Křetínka River and Svitava River, preserved complex of the unique mill in Zboněk, areas of textile and engineering factories on the original water mills, the relief water tower of the Březová water main).

One of the key WM work in the Svitavy region is the so-called 1st Březová water main, constructed in 1913 and supplying drinking water to the town of Brno. The water main forms a kind of imaginary axis of the entire river basin, creating a parallel “waterway”. It is technologically unique (the Banín spring near Březová nad Svitavou town, collecting and piping system between Březová nad Svitavou and Brno towns, galleries, sliding houses, etc.).

A thorough search of archive material and available professional literature has started on the issue of selected WM sites in the pilot area, allowing mapping of water management works to be placed in the wider economic and social framework and will provide a basic historical context. Due to the large number of captured objects of various typologies, the definition of smaller territorial units was made in
which a detailed historical analysis can be carried out. Within the interdisciplinary discussion, three sub-units were selected, each of which represents a specific geographic, water management and historical region with a different typology and its own development of water management objects. The first area is the narrow, several kilometres valley of the Radiměř Stream (the tributary of the Svitava River), which is quite isolated by the dense concentration of water mills (15 preserved or relict objects) in a small area and at a small flow rate. The second area is a part of the Svitava River line from Banín town to Rozhiani village, for which the partial transformation of WM facilities in connection with the industrialization process (paper mill, textile factory) is characteristic. The third region is the valley of the submerged Punkva River near the town of Blansko, which has been a key economic (industrial) zone within Moravia since the 17th century and is characterized by a massive transformation of the original WM facilities into industrial plants (powder mills, mills, paper mills, hammers). The main task in the sub-zones is documentation of water management units, identification with the current state and registration of changes in their function.

The field and research work was primarily focused on part of the research project focused on the detailed field research. In parallel, the work leading to the compilation of the Methodology, which is of a more comparative nature, has taken place. Within this research phase, monitoring was started also in the remaining pilot sites: the Čáslav region (Pařížov, Čáslav), the Česká Lípa region (Ploučnice Gap, Břehyně Pond, Mácha Lake, Nové Zámky Pond, Holany ponds, Velence) and the Pojizeří region (Tanvald, Spálov, dam Les Království). The field research, data analysis and search have focused on water management facilities such as a dam, large hydroelectric power station. These two types of objects will be a primary sample where methodological procedures set out in the interdisciplinary discussion will be verified. A list of all the dams in the Czech Republic will be created with details from the analysis of historical and technological data. The analysis will serve as a basis for setting the evaluation in the Methodology, while a list of objects suitable for the initiation of the monument protection process will be designed.

Figure 2. Holanské rybníky (Holany ponds). Enter the area with the mill wheel (doesn’t exist in present). The “wheel” space is digget into the rock, as well as the drain from the pond.

5. Conclusion
Resulting guidelines should serve as a supportive tool for professionals and executive bodies in heritage care, administrative authorities but also for engineers and object owners. The map sets will be implemented in the National Heritage Institute’s information system, so that the information system will be extended with the new comprehensive thematic database of historical water management from five different historical periods and various regions of the Czech Republic. Moreover, the new
database of the identified historical water management objects in the selected study sites will be integrated too. The aforementioned maps will illustrate the development over the period from the objects’ origin to the present.

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