

Historic floods on Rakovnický stream

This year, TGM WRI is planning to publish a book by Kašpárek, Elleder, Šírová, Dragoun, and Kašpárek Jr., dedicated to floods in the Rakovnický stream basin. It is primarily focused on the occurrence of floods before the start of instrumental observation, that is before 1898. Its purpose is to maximally expand knowledge about the frequency, seasonality, and most significant flood cases, their causes, extent, impact, and damage over the last 500 years.

In periods from which less data and descriptions have been preserved in the studied basin, the authors try to follow up on documented floods in another, lower part of the basin, or in another, geographically close basin.

The oldest mentions and documents of the occurrence of floods that have affected the area of the current Czech Republic usually come from the 15th and 16th centuries (with the exception of the capital city of Prague, where floods are documented since the 12th century), which also applies to flood events in the Rakovnický stream basin. The authors of the book divided the observed period into three time stages, mainly according to the preservation of sources, which was positively influenced by the period of Renaissance humanism in the 16th century, and negatively by protracted wars during the 17th century.

The first period covers the years 1496 to 1620, while the first traceable record of the flood situation in Rakovník and the surrounding area describes the demolition of the so-called "Jilhánek mill", whose location, however, is uncertain today. For example, the flood in the summer of 1531 is significant, which had extreme consequences and was somewhat similar in scope to the much better-known and later flood in 1872.

The subsequent dry period is also worth mentioning, especially the years 1536 and 1540, which was known throughout Central Europe as the driest year of the 16th century.

The preservation of reports and documents about the occurrence of floods in **the second period** (after the Battle of White Mountain in 1620), is strongly influenced by unfavourable political developments, especially the 30 Years War and the subsequent deep transformation of society. The adverse circumstances of this coldest period, the so-called "Little Ice Age", led to a decline in chronicling. In the available historical annals, there are only documents and references to significant regional floods in May 1651 and February 1655, but they are only very brief or indirect. It was not until the end of the 17th century that two catastrophic torrential floods are documented, occurring not long after each other. The first one occurred on 30 June 1694, and probably the worst flood in the history of Rakovník took place after midnight on 22 July 1698. As a result of the torrential rain, the Jesenice ponds burst and it caused severe damage to the town of Rakovník, including deep flooding of the square, as well as loss of life.

The third period – and best documented – is the 18th and 19th centuries. In the third chapter, an overview of archival sources on floods is supplemented by inundation in some nearby basins (Loděnice, Bakovský stream, Střela, and Javornice), which document the occurrence of more frequent flash floods, for example in 1743, 1744, 1752, 1762, 1763, 1783, and 1796. In the 19th century, more significant summer floods occurred in 1824, 1837, 1852, 1872, and 1882. The flood event of June 1824 is important, extremely affecting both the entire Berounka basin and Prague on the Vltava river. The well-known March flood of "European dimensions" from 1845 had severe effects on Rakovník as well; it shows from the context that it surpassed previous events in the 19th century. In addition to the May flash flood of 1852, the study looks in detail at the well-documented and exceptionally extreme event of 1872. It is one of the biggest Czech disasters that affected the Berounka basin below Pilsen, with huge flows on the Litavka, Střela, Rakovnický stream, and other tributaries of the Berounka. The flood was caused by torrential downpours of an exceptionally large area and intensity. From the point of view of Rakovnický stream, it is important that the area affected by the extreme rainfall reached from

Jesenice district up to Senomaty. Since the study was created more than ten years ago, we will leave some details until the final text. The authors clarified or expanded some facts against the original manuscript. Some of the historical cases (1872) are already included in the Krolmus-MEF (Map of Extreme Floods) application [<https://chmi.maps.arcgis.com/apps/MapSeries/index.html?appid=dc50b65b4483465cb-98c50d4b55df75d>], others will be added to it in the near future (1531, 1824, and 1845).

Documentary sources also reveal the interesting fact that the flood of May 1872 in Rakovník, despite its extraordinary and devastating nature, apparently did not reach as high a water level as that of the summer of 1698. This follows from the description of the flooding of the square, the height of which did not undergo significant changes. In 1698, the water level reached a height of about 150 cm in the square and a number of houses there were completely destroyed.

As far as damages are concerned, then telling proof of dynamic effects, or reached speeds and high-water level, there is damage or collapse of ponds. This is, on the one hand, a consequence, and on the other, an aggravating factor of the flood.

As for the number of victims, the figures for the two most significant floods from 1872 and 1698 are quite comparable. However, it is difficult to compare the material damage caused by these two floods; in 1698 it was estimated at 3,000 guildens in Senomaty, and in 1872 at 80,000 guildens. The authors documented and targeted markers in the lower part of the basin and attempted to estimate the peak flow of 25 May 1872.



The destroyed bridge of the Buštěhrad Railway, the flood of 1872

The seasonality of floods is also worth mentioning. Summer cases significantly predominate, with floods in May, June, and July. As for the cause, it was often short torrential rains, to a lesser extent also regional and more permanent. Significant winter floods are recorded only in 1595 and 1845, although we can assume that the absence of evidence of extreme floods is more indicative of the insufficiency of chroniclers' sources of that time.

The forthcoming book about Rakovnický stream basin will also contain many quotes from old chronicles as well as beautiful period pictures and photographs; the basin has changed significantly over time, especially with regard to the disappearance of ponds, the disappearance of coal mining, and changes in agriculture.

The materials for the book are based on the results of the project "Possibilities of mitigating the current consequences of climate change by improving the storage capacity in the Rakovnický stream basin (pilot project)", financed under No. QH 91247 by the National Agricultural Research Agency (NAZV) of the Ministry of Agriculture of the Czech Republic in 2009–2011.