DOI: 10.31577/ahs-2025-0026.02.0028

ACTA HYDROLOGICA SLOVACA

Volume 26, No. 2, 2025, 280 – 291

The severe ice flood of 1876 on the Nitra River in Nové Zámky, in the context of other floods in the Danubian Lowland, Slovakia

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While studying historical floods on the Nitra River, we encountered a reference in period newspapers to a commemorative plaque that marked a significant flood event in 1876 in the town of Nové Zámky. Our research aimed to identify the original location of this plaque in Nové Zámky and to gather more detailed information about this major flood. We found that floods occurred simultaneously in several other rivers and locations across the Danubian Lowland in Slovakia. Through climatological assessments and analyses of historical documents, we were able to determine the causes, timing, and, most-importantly, the extent of the damage caused by these floods. Our findings was classified the ice flood of 1876 on the Nitra River as a level 3 flood event, representing the highest intensity category

KEY WORDS: ice flood, documentary data, climatological data, Nitra River, flood mark

Introduction

The origins of water level monitoring in Slovakia date back to the 19th century. Within the Nitra River basin, instrumental records of water level and discharge have been available from the gauging station at Nové Zámky since 1911, and data on water discharge from the station at Nitrianska Streda since 1924. The existing database of systematic hydrological observations can be enhanced by indirect evidence derived from documentary sources. Such records can be found in various archives, including historical documents, period newspapers, chronicles, official reports and decrees, books, maps, photographs, flood marks, and other sources (Munzar et al., 2005; Brázdil and Kundzewicz, 2006; Demarée, 2006; Brázdil et al., 2007; Elleder, 2010; Brázdil et al., 2012; Pekárová et al., 2014; Brázdil et al., 2024). Selected historical flood events have been evaluated for Slovakia, particularly for the Danube River, as well as for other rivers such as the Váh, Hron, Poprad, Slaná, Turiec, and Hnilec (Horváthová, 2003; Pišút, 2011; Melo and Bernáthová, 2013; Halmová et al., 2013; Pekárová et al., 2013; Melo et al., 2014; Pišút et al., 2016; Bendík, 2020; Melo et al., 2022). However, there has not been a dedicated study on the historical floods of the Nitra River. Our previous work (Melo et al., 2025) contributed to this topic by evaluating and comparing the incidence of floods and ice phenomena from 1920 to 1939 using documentary and instrumental data. While reviewing archival materials related to historical floods in the Nitra basin, we discovered a reference in the period newspapers (*Érsekujvár és Vidéke*, dated July 16, 1933) to a commemorative plaque marking the flood of 1876 that affected Nové Zámky. This study aims to identify the location (object and site) associated with this flood mark and to gather detailed information about the flood event, including its timing, spatial extent, progression, causative factors, and resulting damages. Based on the data collected, we seek to classify the flood intensity using a three-tier scale. Given the lack of hydrological measurements on the Nitra River in 1876, our analysis relies on documentary evidence (primarily period newspapers), focusing not only on the vicinity of Nové Zámky but also on other rivers within the Danubian Lowland in Slovakia. Additionally, a climatological assessment of the 1876 flood event in this region will be presented.

Material and methods

Our research focused on historical records of the 1876 flood within the Nitra River basin and other locations in the Danubian Lowland, as documented in various archival sources, particularly period newspapers. The regional press coverage around Nové Zámky was historically represented by the weekly *Érsekujvár és Vidéke*, which has been published in Hungarian since 1881. The Ján Thain Museum in Nové Zámky holds incomplete volumes from 1933 to 1939, with only 1938 being complete. We reviewed all available issues of this

publication to search for additional historical references to the 1876 flood. We also examined other regional documents housed at the Ján Thain Museum and the State Archive in Nové Zámky. These include minutes from municipal council meetings and records from notarial offices dating back to 1810. Given the proximity of Nové Zámky and the historical confluence of the Nitra and Váh Rivers near Komárno, we extended our search to Hungarian-language newspapers, *Komáromi lapok* and *Komárom*, published in Komárno. The archive of the Danubian Museum in Komárno holds issues of *Komáromi lapok* from the years 1871, and from 1880 to 1942, with gaps due to unknown interruptions in publication; however, only one year (1880) of *Komárom* is available. Thus, the year 1876 is completely missing. For this study, we reviewed all available editions of both newspapers from 1871 to 1900. Additional information regarding the 1876 flood was found in *Obzor*, a Slovak-language newspaper focused on agriculture, crafts, and domestic life, published three times monthly in Skalica (comprising 36 issues totalling 288 pages in 1876, all of which were reviewed). We also examined the *Pressburger Zeitung*, a German-language daily published six times a week in Bratislava, specifically issues 33–99 from February 11 to May 1, 1876, and the *Wiener Zeitung*, a German-language daily published in Vienna, focusing on issues 35–57 from February 13 to March 10, 1876, including the evening editions of *Wiener Abendpost*. Relevant insights were also provided by Horváthová (2003) and Nagy (2007). In the article, the following abbreviations are used to reference sources: OB – *Obzor*, EV – *Érsekujvár és Vidéke*, PZ – *Pressburger Zeitung*, WZ – *Wiener Zeitung*. Contemporary names of towns and municipalities are used throughout the study, while administrative divisions reflect those referenced in the 1876 press, as some municipalities have since merged or become parts of other towns.

To assess historical flood events and evaluate their intensity, classification systems with three, four, or five levels are commonly used. For the 1876 flood, we utilised the three-level classification proposed by Kiss (2019), which is based on primary indicators (extent of damage) and secondary indicators (duration of flooding):

- Level 1 – Minor Regional Floods
  - Primary Indicators: Minor damage, such as inundated fields and gardens near the river and the relocation of stored timber from riverbanks.
  - Secondary Indicators: Short-term inundation.
- Level 2 – Above-Average or Supra-Regional Floods
  - Primary Indicators: Damage to hydraulic structures and buildings near the river, including dams, weirs, footbridges, bridges, and mills, as well as water intrusion into buildings.
  - Secondary Indicators: Moderate flood duration, significant damage to agricultural land, loss of livestock, and occasional human casualties.
- Level 3 – Catastrophic Supra-Regional Floods
  - Primary Indicators: Severe damage or destruction of hydraulic infrastructure and buildings, such as dams, weirs, bridges, and mills, with some buildings being washed away or demolished by floodwaters.
  - Secondary Indicators: Prolonged inundation lasting days or weeks, extensive agricultural damage, high mortality among livestock and humans, and morphodynamic processes such as sand sedimentation that cause permanent changes to the landscape.

For the climatological analysis of the 1876 flood, we utilised air temperature and precipitation data from meteorological stations in Budapest and Sopron, sourced from the Hungarian Meteorological Service database (HungaroMet Magyar Meteorológiai Szolgáltató Nonprofit Zrt., https://odp.met.hu), as well as from Hurbanovo (Slovak Hydrometeorological Institute Bratislava; Petrovič, 1960) and Bratislava (Konček, 1979). More information about meteorological observations in Sopron can be found in Muraközy et al. (2025). This dataset was further enriched with information extracted from period newspapers.

Results

Commemorative plaque for the 1876 flood on the Nitra River in Nové Zámky

While studying the 1933 issue of the newspaper *Érsekujvár és Vidéke*, we gathered important information about an earlier flood in Nové Zámky that occurred in 1876. The article stated, "*The flood of 1876 swept away the sluice gate near Zúgov. During demolition works in 1933, a marble plaque was removed from the wall of an old building. It contained information about the mentioned flood. The newspaper called on the city council to acquire the plaque for the municipal museum*" (EV, 16 July 1933).

During our search for this plaque at the Ján Thain Museum in Nové Zámky, we learned about an existing exhibit in their depository that relates directly to the flood event in question (Fig. 1). The commemorative plaque, measuring 70 cm in height, 125 cm in width, and 12 cm in depth, features a Hungarian inscription carved into rectangular marble:

„*AZ 1876-ÉVI RENDKÍVÜLI ÁRVIZ ÁLTAL*
E MŰ SZÉTROMBOLTATVÁN
BÍBORNOK HERCZEG PRIMAS SIMOR JÁNOS
ÁLTAL ALAPJAIBÓL ÚJRA FELÉPITETETT"

This translates to: "This structure was destroyed by the extraordinary flood of 1876 and rebuilt from its foundations by Cardinal and Archbishop János Simor."

This commemorative plaque is associated with the reconstruction of the Archbishop's Mill (later known as the Klein Brothers' Mill), located on Medzimlynie Street in Sihoť Park, Nové Zámky. It was commissioned by Cardinal János Simor (1813–1891), the Archbishop of Esztergom, to commemorate the renovation of the mill following the 1876 flood. At that time, the mill belonged to the Esztergom Archdiocese, which traces its founding back to Archbishop Péter Pázmány in the 17th century. Following the destruction caused by the flood,

Archbishop Simor commissioned the reconstruction of the mill at its original location. The mill was situated along a constructed millrace derived from the Nitra River, positioned on the eastern-northeastern edge of the city (Fig. 2). An old engraving depicts the mill's original appearance (Fig. 3). Following several



Fig. 1. Commemorative marble plaque providing information about the 1876 flood. Source: Ján Thain Museum, Nové Zámky.

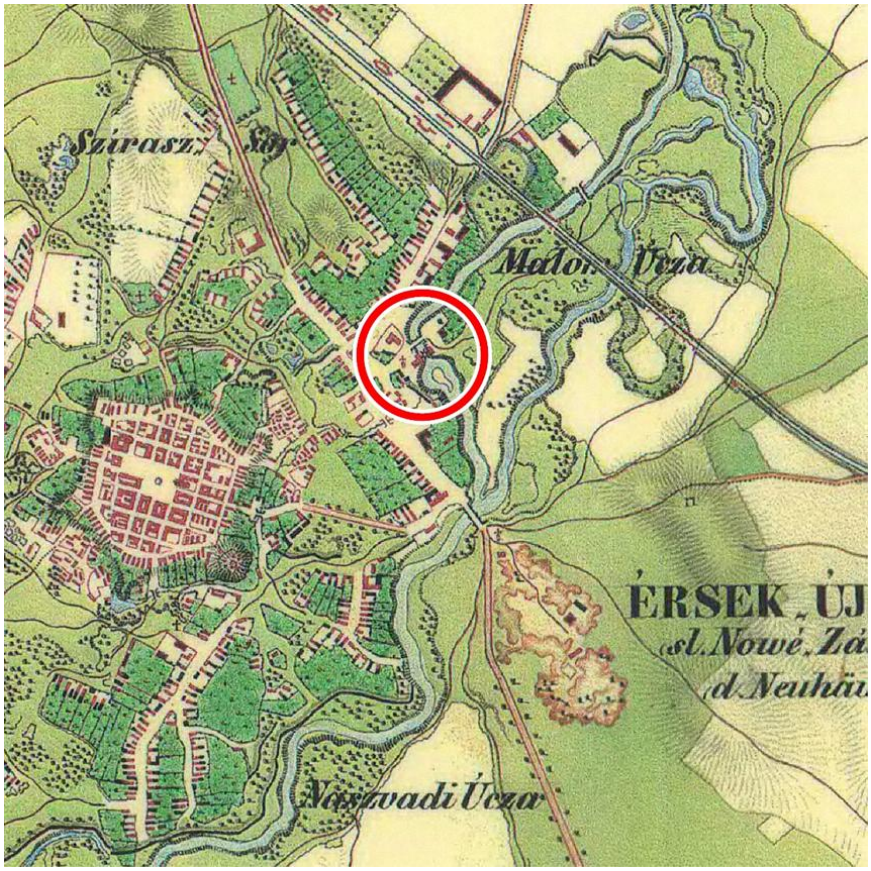


Fig. 2. The Archbishop's Mill (later known as Klein's Mill) in Nové Zámky, as depicted on the Second Military Mapping Survey conducted in southern Slovakia between 1837 and 1858. (Note: On the original map, the mill is represented with a mill wheel symbol and is located at the centre of the red-and-white circle highlighted by the authors). Source: National Geoportal, Ministry of Environment of the Slovak Republic. Available at: [https://geoportal.gov.sk/maps/default/datasets?view=-404383,-1223571,304.7887656217&adhoc-dataset-id=f6a9ae10-9b22-489c-bbfe-e6751700a6ae], [accessed: 23 April 2025].

expansions and modernisation efforts, one of which likely occurred in 1933, the mill transformed into a substantial complex with mill buildings on both sides of the extensive millrace. This complex later came under the ownership of the Klein brothers. Although the mill buildings were demolished in 1972, the hydraulic structure remained intact, including the sluice bridge, turbine shafts, turbines, and their transmission systems (Fig. 4). In the vicinity of Nové Zámky, there was another mill that also belonged to the archbishop, visible on some old maps and located slightly upstream on the Nitra River. By 1933, when the newspaper EV mentioned demolition works at the mill and the commemorative plaque for the 1876 flood, the second mill no longer existed.



Fig. 3. Historical appearance of the Archbishop's Mill in Nové Zámky, where the commemorative plaque related to the 1876 flood on the Nitra River was placed. Source: Ondrej Berta, Photo Album of the Town of Nové Zámky. Available at: https://www.nzalbum.sk/sk/fotografie/1141?album=39, [accessed: 25 March 2024].



Fig. 4. Current condition showing the remnants of the former Archbishop's Mill in Nové Zámky, where the commemorative plaque related to the 1876 flood on the Nitra River was once located. Photo: M. Melo, 27 March 2024.

Climatological assessment of the year 1876 in the broader Danubian Lowland region

Meteorological data from several stations in the vicinity of Nové Zámky, specifically Hurbanovo, Bratislava, Budapest, and Sopron, are available from the year 1876. By analysing data on atmospheric precipitation and air temperature, we can estimate the timing of the flood event and clarify its causes. Hurbanovo is located in the Žitava River basin, which is part of the Nitra River catchment. In 1876, the highest monthly precipitation total was recorded in February, reaching 120 mm, which represents 364% of the average February precipitation based on the 75-year Hurbanovo climatological period from 1876 to 1950 ((see Fig. 5). This total remains the highest February precipitation ever recorded in Hurbanovo for the period up to 2025. The second-highest monthly total in 1876 occurred in September, reaching 96 mm (209% of the average September precipitation from the 1876–1950 period). However, these rains fell after two very dry summer months (July and August), making a significant flood risk in September unlikely. Additionally, based on the precipitation conditions, no major flood events are expected in the remaining months of 1876. We deduce that the only plausible time frame for a destructive flood in this region was between February and early March 1876.

According to Konček (1979), the winter of 1875/76 in Central Europe, based on data from Bratislava, was classified as severe. In Hurbanovo, December 1875 was 2.9°C colder, and January 1876 was 5.2°C colder than the average temperatures from the 1871–1950 period. February 1876 was 1.3°C warmer than the average; however, the weather pattern varied significantly between the first and second halves of the month. The first half of February remained cold, while the second half experienced a marked warming trend. Overall, from early December 1875 to mid-February 1876, the region faced persistently cold conditions, with predominantly negative air temperatures and the formation of snow cover. The Budapest meteorological station recorded mean daily air temperatures at or below 0°C (with few exceptions) from December 5, 1875, to February 15, 1876. Similarly, the Sopron station observed this temperature trend from November 26, 1875, to February 15, 1876, and Hurbanovo station from November 27, 1875 (respectively December 5, 1875), to February 15, 1876 (see Fig. 6). For comparison, the average air temperatures were as follows: in Hurbanovo for December 1875, -3.0°C (Budapest -1.2°C, Sopron -3.1°C); in January 1876, -5.3°C (Budapest -4.2°C, Sopron -5.7°C); and in February 1876, -1.3°C (Budapest 0.0°C, Sopron -0.8°C). In the mountainous areas of the Nitra River basin, average daily air temperatures likely remained below freezing throughout the period from December 1, 1875, to February 15, 1876, allowing for the accumulation of snowpack from precipitation. During this period, Budapest recorded a total of 98.7 mm of precipitation, while Sopron recorded 120.8 mm and Hurbanovo up to 142.4 mm (see Fig. 7). Following the warming in the second half of February, ice began to melt in rivers, and snowmelt occurred throughout the region. This melting was accompanied by additional precipitation, mostly in liquid form. From February 16 to 29, 1876, Budapest recorded an additional 13 mm of precipitation, Sopron recorded 29.4 mm, and Hurbanovo even up to 49.2 mm (see Fig. 7). Based on the meteorological data

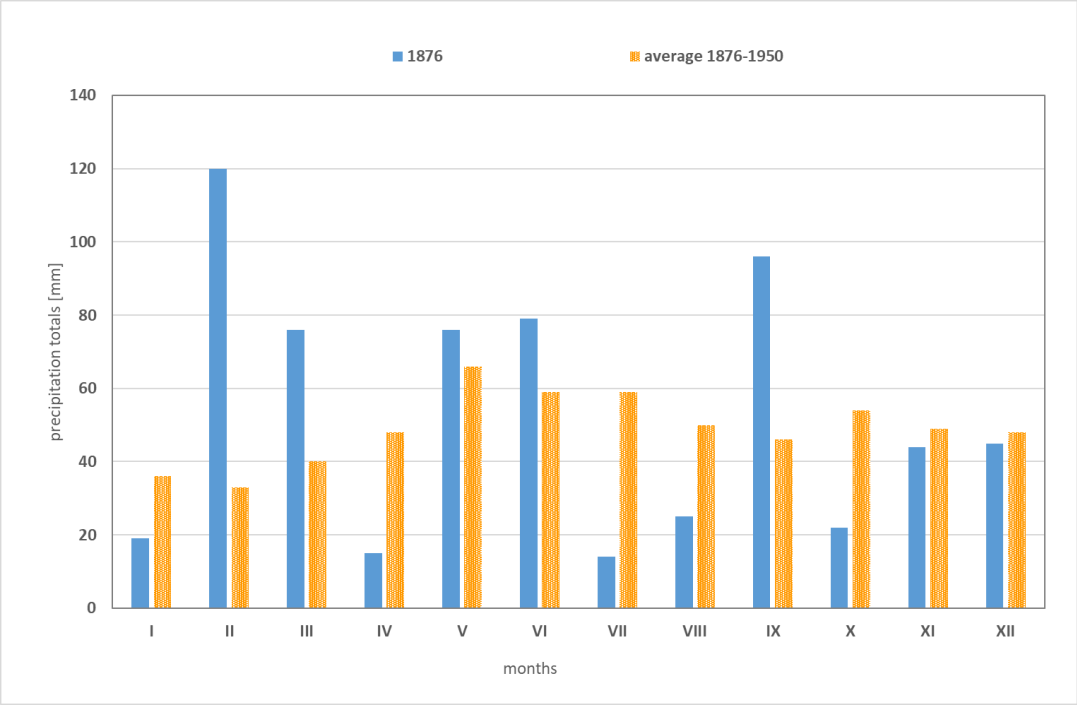


Fig. 5. Monthly precipitation totals [mm] at the Hurbanovo meteorological station in 1876, compared to the average for the period from 1876 to 1950. Source: Petrovič, 1960.

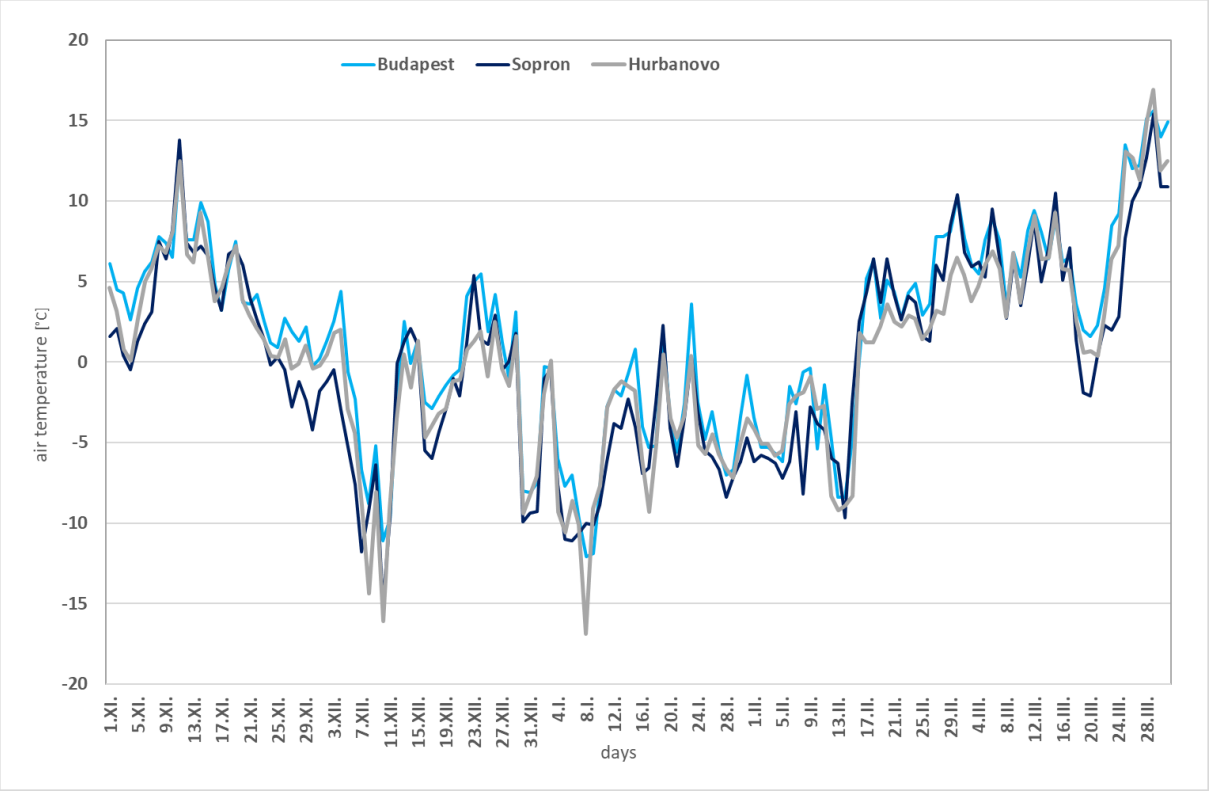


Fig. 6. Average daily air temperature [°C] in Budapest, Sopron, and Hurbanovo from 1 November 1875 to 31 March 1876. Source: Slovak Hydrometeorological Institute Bratislava and HungaroMet Magyar Meteorológiai Szolgáltató Nonprofit Zrt. Available at: [https://odp.met.hu], [accessed: 11 March 2025].

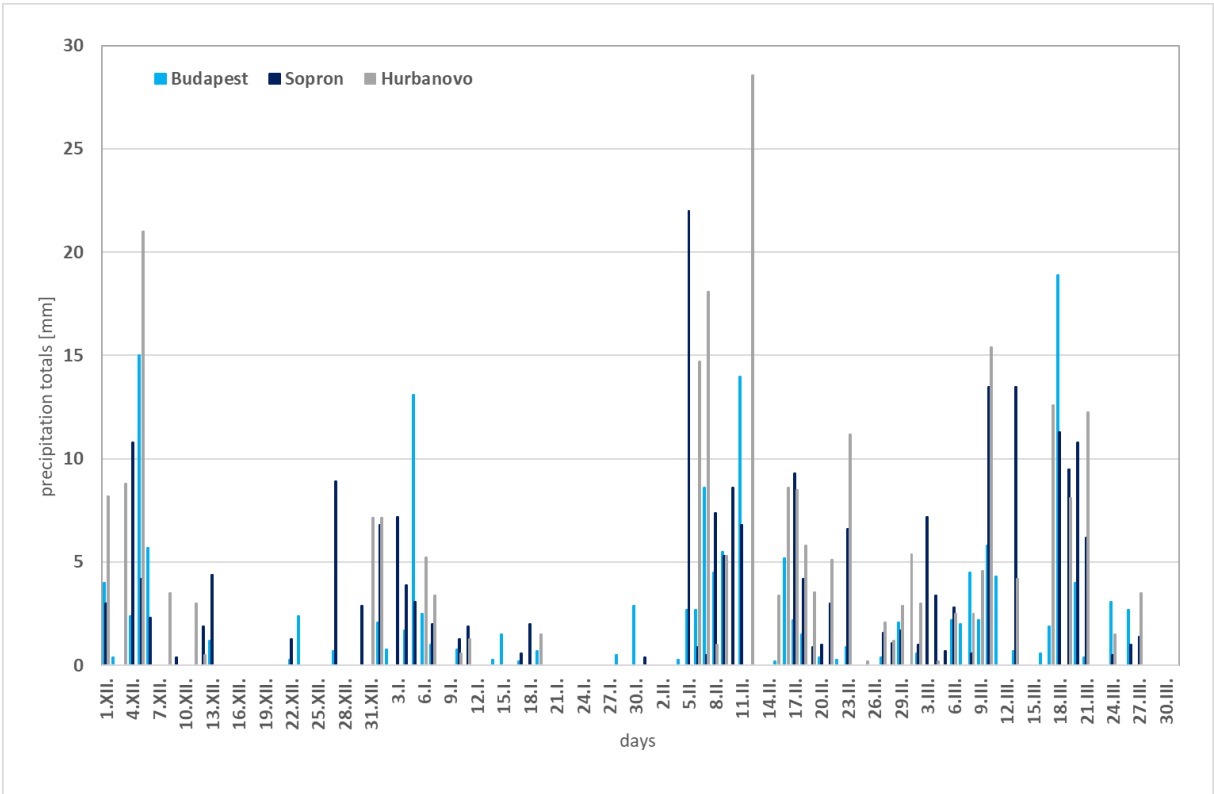


Fig. 7. Daily precipitation totals [mm] in Budapest, Sopron, and Hurbanovo from 1 December 1875 to 31 March 1876. Source: Slovak Hydrometeorological Institute Bratislava and HungaroMet Magyar Meteorológiai Szolgáltató Nonprofit Zrt. Available at: [https://odp.met.hu], [accessed: 11 March 2025].

from the broader region, it is likely that increased river discharge in the Nitra River basin occurred in the second half of February, with peak flow around the end of the month. The flood was primarily caused by the melting of the accumulated snow from the winter period. River conditions were further complicated by melting and drifting ice, and new rainfall also contributed to the runoff.

Floods of 1876 on the rivers of the Danubian Lowland in historical records

Through the study of historical documents, we have discovered that the floods of 1876 impacted a vast area of Central Europe and even parts of Western Europe, occurring approximately from mid-February to mid-April. Within the territory of present-day Slovakia, evidence of flood events during this period was found on the following rivers: Morava, Dunaj (Danube), Čiližský potok (Čiližský Stream), Malý Dunaj (Little Danube), Šárd, Derňa, Čierna Voda, Dudváh, Váh, Kysuca, Nitra, Žitava, Ipeľ, Hron, Bodrog, and Tisa (Tisza). However, this article focuses exclusively on flood events within the Danubian Lowland region.

The floods in Slovakia were preceded by reports of a severe winter in 1875/76, which resulted in substantial snow accumulation. For example, harsh winter conditions with significant snowfall were reported in Levoča, where it was noted that "*due to heavy snowfall, roofs of several houses collapsed under the accumulated weight of snow in various villages in the Spiš region*" (PZ 18.2.1876). In Ľubietová (Hron basin), "*a large amount of snow fell between 11 and 12 February, exceeding all previous snowfall totals; on 14 February, the air temperature dropped to -17.5 °Re. In the latter half of February, a sustained thaw occurred, and by the end of the month, except for deep drifts, the snow had melted*" (Obzor 15.3.1876). "*It was an unusually harsh winter; major rivers across Europe were breaking their ice cover*" (PZ 28.2.1876). In a letter from Minister Koloman Tisza to the citizens of (historical) Hungary, it was reported that "*due to the rapid melting of large snow masses, several rivers in* (historical) *Hungary suddenly overflowed*" (PZ 3.3.1876). "*A warning from Mátraverebély* (Zagyva basin) *indicated that tributaries flowing from the Carpathians surged enormously due to the melting of significant snow accumulations*" (PZ 7.3.1876). Numerous reports in the period press (PZ, WZ, OB) also documented ice phenomena in February 1876, especially along the Danube and its tributaries. After the warming, when the snow cover and river ice began to melt, flooding ensued. Flooding was particularly severe in areas where ice jams formed or levees were breached. In some locations, persistent rainfall also contributed to the situation: "*Last week, nearly continuous rainfall dominated across Central and Western Europe*" (PZ 6.3.1876).

The most extensive and persistent reports of flooding in 1876 in the Danubian Lowland region of Slovakia were published in the newspaper Pressburger Zeitung between 22 February and 14 March 1876, as well as in Obzor, which repeatedly covered these events in issues 7 through 14 from 5 March to 15 May 1876. The floods on the Danube and Váh near Komárno occurred in the second half of February and continued into early March. Reports from the press indicated the end of the flood situation in this area: "*The Danube and Váh have significantly receded, and their tributaries have returned to their regular channels*" (PZ 14.3.1876). "*After three weeks of devastation caused by the raging Danube and its tributaries, on 14 March the waters began to recede slowly but steadily along the entire stretch from Budapest to Bratislava*" (OB 25.3.1876).

Flood-related issues around Komárno (in the Danubian Lowland) were caused by the Danube River, as well as the Little Danube, the Váh, and their tributaries, including the Nitra, (see Fig. 8). The progression of the flood in the rivers near Komárno unfolded as follows: On February 21, 1876, the Danube began rising at Komárno, increasing by 80 cm overnight. By the afternoon, the water level reached 496 cm, and ice floes were rushing downstream at high speed. An ice jam formed near the village of Neszmelyi, raising the water level in Komárno to 614 cm. Subsequently, the Váh River, which flows into the Danube at this location, began to flow upstream with such intensity that it destroyed a bridge (Nagy, 2007). „*On February 22, two bridgeheads on the main Danube branch in Komárno were damaged by waves; water breached levees and flooded the town, and ice masses caused the Váh bridge to collapse*" (PZ 23.2.1876). „*By February 24, water had entered the town, submerging houses near the Danube*" (PZ 26.2.1876). Reports indicated that „*below Komárno, a full-depth ice barrier formed in the Danube channel, colliding with water and ice from Bratislava. The Váh bridge was pushed upstream by massive blocks of ice, and the fortress walls in Komárno were breached in two locations, resulting in widespread flooding of the town*" (OB 5.3.1876). „*Significant damage also occurred to the imperial-royal military stores in Komárno, where nearly all supplies of gunpowder and food stored in the fortress were destroyed by the flood*" (OB 15.3.1876). „*When the Danube reached its peak water level in February, massive ice blocks began pushing upstream into the Váh, destroying rafts and timber stockpiles. The force of the water lifted the bridge and carried it one and a half miles upstream, leaving it in damaged condition and requiring it to be dismantled or reinforced for safe passage*" (OB 25.3.1876, PZ 4.3.1876).

Upstream of Komárno (see Fig. 8), on the evening of February 23, the villages of Vojka nad Dunajom (which experienced damaged houses), Dobrohošť, Rohovce, Blatná na Ostrove, Šuľany, and Horný Bar were flooded (PZ 24.2 and PZ 28.2.1876). On February 26, Dobrohošť and Vojka nad Dunajom were flooded again, suffering even more severe damage than during the first flood (PZ 26.2.1876). In Horná Baka and Dolná Baka, mills were damaged, ten houses collapsed, and road access was significantly disrupted (PZ 26.2.1876). Later reports indicated, "*Access to Horná and Dolná Baka is still only possible by boat, and the damage to bridges and roads is very serious*" (PZ 2.3.1876). Gabčíkovo experienced

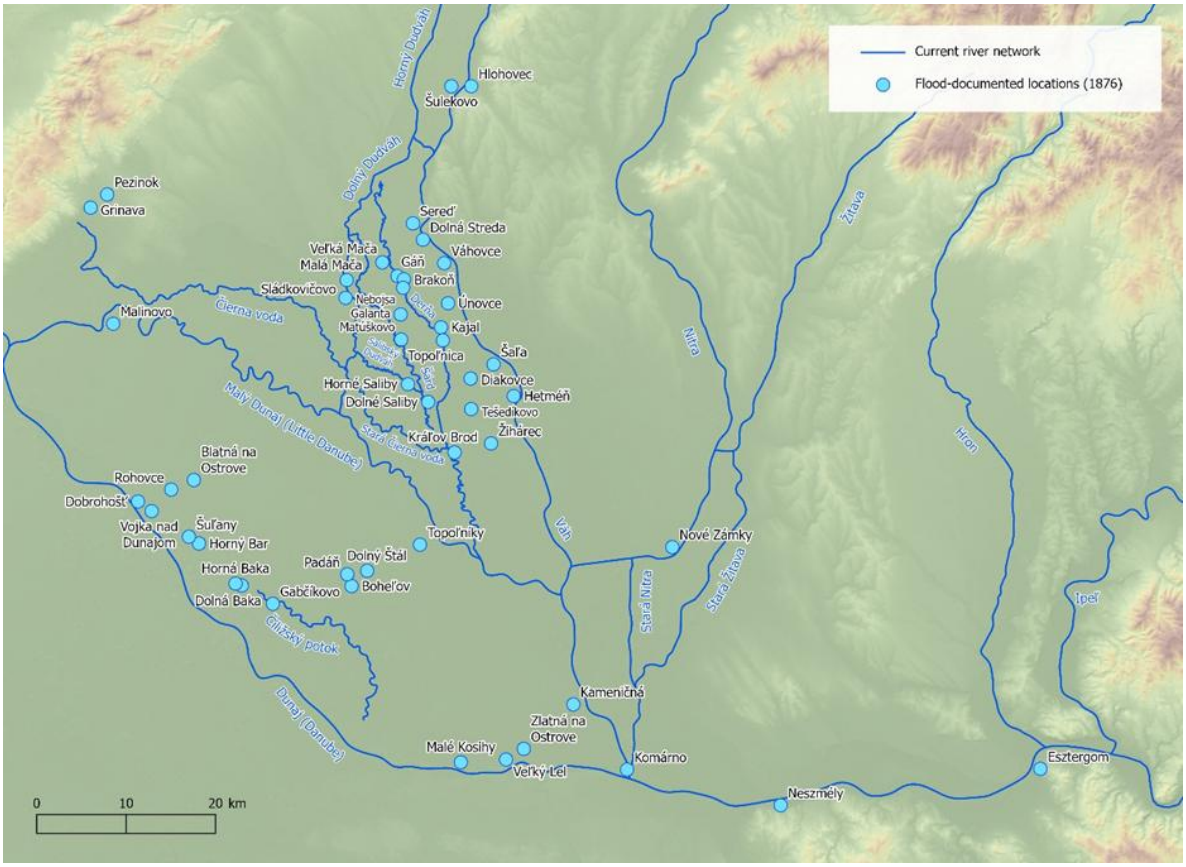


Fig. 8. Occurrences of floods in the Danubian Lowland between 21 February and early March 1876.

two consecutive flood waves. The first occurred on February 23 and 24, inundating the village completely, causing several houses to collapse, and inflicting major damage on mills and other properties, although fortunately, there were no fatalities (PZ 2.3.1876). The second wave struck on February 26, causing further flooding of roads (PZ 26.2.1876). In the Danube villages of Malé Kosihy, Veľký Lél, and Zlatná na Ostrove, levees were breached on February 24. "*Since then, nearly the entire area of Žitný ostrov has been under water. Only treetops and the ruins of collapsed residential and agricultural buildings remain visible. It is rare to find an undamaged house. Livestock perished, and increasing volumes of water continue to flow into the Danube channel from all tributaries across the extensively flooded Győr County*" (PZ 8.3.1876). Downstream of Komárno, in addition to the previously mentioned ice flood from Neszmelyi to Komárno, another flood was reported in Esztergom on February 25, during which several streets were inundated, and houses collapsed (WZ 25.2, PZ 26.2.1876).

Flooding also affected the Little Danube and the Žitný ostrov region, which lies between the Danube and the Little Danube (Fig. 8). On February 22, the Little Danube swept away several barges and timber stockpiles, leading to partial flooding in Malinovo (PZ 24.2.1876, Nagy 2007). The Žitný ostrov region was nearly completely flooded (OB 5.3.1876). Flooding also occurred along the Čiližský Stream, which was historically a side arm of the Danube, forming a large inland delta in this area. Originally, the stream branched off from the Danube near Čilistov and flowed through Dobrohošť, Šuľany, Horný Bar, Trstená na Ostrove, Baka, Gabčíkovo, Pataš, and between Čiližská Radvaň and Veľký Meder before rejoining the Danube near Číčov. However, since the 17th century, the stream had been gradually shortened due to various interventions. According to the Second Military Survey map (1837–1858), the stream was labelled as "Csiliz" and only flowed from Baka to Číčov. It is believed that on February 23, 1876, the Danube overflowed its levee near Baka into the Čiližský Stream, causing damage in Gabčíkovo and continuing downstream to its mouth near Číčov. Newspapers reported yet another flooding event at the end of February and beginning of March in areas traversed by the Danube, Little Danube, and Čiližský Stream. „*Specifically, in the lower part of Žitný ostrov, the flood began inundating the villages of Padáň, Dolný Štál, Boheľov, and other settlements along the route, making homes uninhabitable due to widespread flooding. Backwater flooding was particularly evident in all settlements along the Little Danube branch. In the main channel of the Danube, water continued to flow slowly downstream, and by February 26, several villages had experienced further flooding*" (PZ 2.3.1876). This indicated a third consecutive flood wave on the Danube.

A subsequent report stated: "*Water levels in the lower part of Žitný ostrov are receding, but backflow from Komárno still reaches as far as Topoľníky, Dolný Štál, Boheľov, and Padáň. The condition of the levees is deteriorating, and it is unlikely they will withstand another flood wave. The postal service from Veľký Meder to Dunajská Streda has been operating for two days, but return delivery from Dunajská Streda remains impossible…*" (PZ 14.3.1876).

Significant damage in this region was also caused by smaller rivers located between the Little Danube and the Váh, such as the Čierna Voda, Dudváh, Šárd, and Derňa (Fig. 8). The most severely affected area was Sládkovičovo, near the Dudváh River, which was nearly entirely inundated on February 24 (PZ 24.2.1876). Reports stated, "*Many smaller houses collapsed here, and several others are on the verge of collapse; today the water is receding. This is the largest flood in the past 30 years in this area*" (PZ 25.2.1876). „*To protect themselves from the continuously rising floodwaters, the residents of Sládkovičovo breached the railway embankment leading from the train station to the local sugar refinery. When this did not yield the expected results, they attempted to breach the state railway embankment as well*" (PZ 26.2.1876). „*It became evident that the main obstacle to water drainage in Sládkovičovo was the excessively low Dudváh bridge*" (PZ 28.2.1876). „*Communication between Trnava and Sereď, as well as between Sládkovičovo and Sereď, was completely disrupted. Although the bridges on rural roads were not washed away, accessing them remained life-threatening*" (PZ 26.2.1876). The village of Matúškovo, located along the Šárd River, experienced significant flooding, resulting in the collapse of ten houses (PZ 24.2, 25.2, and 2.3.1876). The Čierna Voda also overflowed its banks (PZ 2.3.1876). The villages of Nebojsa, Galanta, and Kajal were affected by floods from the Šárd and Derňa rivers (PZ 24.2.1876). In Kráľov Brod, Dolné Saliby, and Horné Saliby, levees were breached, inundating the lower parts of Dolné Saliby (PZ 24 and 25.2.1876). Roads connecting Matúškovo to Horné Saliby and Galanta to Sereď were also flooded (PZ 24.2.1876). As noted, "*Gáň, Brakoň, Veľká, and Malá Mača are surrounded by wild rivers and flooded fields*" (PZ 25.2.1876).

The Váh River caused considerable devastation in local communities (Fig. 8). Residents of Selice managed to prevent the river from overflowing by gradually raising levees. However, other areas encountered breaches, leading to flooded fields. The villages of Diakovce, Tešedíkovo, Žihárec, and Šaľa were inundated (Nagy, 2007). According to the newspaper Obzor, "*The Váh and its tributaries caused extensive damage. The Váh itself destroyed many bridges, particularly those in Trenčín and Hlohovec. Near Sereď, the river overflowed its right bank, flooding the surrounding area, which resembled a vast lake. Despite the widespread devastation, it is fortunate that residents were largely prepared for the floods, successfully protecting themselves, their livestock, and other vulnerable assets. Nevertheless, the damage to buildings, gardens, and fields was extensive and is expected to reach many millions of gulden*" (OB 5.3.1876). A subsequent report noted, "*Due to the flooding of the Váh and Dudváh, 120 houses were completely destroyed in Sereď and surrounding villages*" (OB 15.3.1876). Additional reports in the Pressburger Zeitung provided further details about the flooding along the Váh in this region. In Hlohovec, on February 22, ice from the upper Váh broke loose, and two ice floes damaged the Šulekovo Bridge (now part of western Hlohovec), resulting in flooding in parts of the town (PZ 24.2.1876). In Sereď, the roads were flooded (PZ 22.2.1876). The surroundings of Dolná Streda, Váhovce, Únovce, Kajal, and Topoľnica were encircled by flooded fields (PZ 25.2.1876). Near Hetméň, on February 25, the Váh breached a levee, causing water to surge uncontrollably through Diakovce, Tešedíkovo, and Žihárec, forming a large lake (PZ 25 and 26.2.1876). In Žihárec, transportation was only possible by boat; 50 houses were close to collapse, forcing residents to evacuate. The entire area from Žihárec to Komárno resembled an endless sea (PZ 2.3.1876). The newspapers commended the services of the tugboat "Almás," operated by the Danube Steam Navigation Company under Captain Kolber. The captain provided invaluable assistance to the region during this crisis. "*In times of serious need, the captain navigated the Váh to Kameničná and back — an unprecedented journey for a large steamboat — at the request of the authorities and despite countless dangers. The region also owes a debt of gratitude to the pontoon crew stationed here for approximately ten days, who participated tirelessly and effectively in rescue operations*" (PZ 8.3.1876).

Other nearby river basins mentioned include the Hron and Ipeľ. It was noted that "*the waters of the lower Hron also caused significant damage; however, the flooding of the Ipeľ was even more destructive, forcing the complete suspension of transportation in lower Hont*" (OB 15.3.1876). Regarding the locality of Nové Zámky (Fig. 8), no additional specific references were found in the documents beyond the previously discussed commemorative plaque on the Archbishop's Mill. However, a brief note indicated that floods occurred in the Nitra basin during this time: "*The small stream Žitava and its larger neighbour Nitra flooded several miles of land in the Nitra valley and the Tekov district*" (OB 15.3.1876). Nagy (2007) noted that floods on the Váh, Dudváh, Little Danube, Nitra, and Žitava converged, inundating the entire area from Trnovec nad Váhom to Komárno. The Danube was unable to accept water from the Váh; instead, backflow occurred, flooding the Galanta district as well. Consequently, the Nitra valley was also submerged.

A final mention of flooding was found in newspapers concerning the western edge of the Danubian Lowland near the Little Carpathians (Fig. 8). The report stated: "*Roads around Pezinok are muddy due to heavy snow and rain. The worst part is that nothing has been done about it. The insufficient funds allocated annually are spent on snow removal, leaving no resources for necessary improvements. Since the opening of the Považská Railway* (which used steam traction between Bratislava and Trnava starting on May 1, 1873), *the problem of snowmelt runoff from the Little*

Carpathians has recurred every spring. This water can no longer flow adequately through the elevated railway embankment, as it did during the era of the original horse-drawn railway (operated until 1872). *The lack of drainage through the embankment remains unresolved, and the Pezinok–Grinava road has been under two feet of water for weeks. The excess water then carves paths through Pezinok's fields and the vineyards of neighbouring Grinava, causing destruction everywhere*" (PZ 4.3.1876).

Based on the documented flood peak dates in surrounding municipalities of the Danubian Lowland, as recorded in available historical records, it can be concluded that the peak flood on the Nitra River in Nové Zámky — which damaged the Archbishop's Mill — most likely occurred between February 21 and 27, 1876. Although another flood wave is mentioned in historical press reports around the turn of February and March in the Danube River and flood in the area of Lower Žitný ostrov (PZ 2.3.1876), which could theoretically have affected the Nitra River as well, its description suggests that it had in the area of Lower Žitný ostrov a reverse flow character (moving from Komárno upstream toward the Little Danube). Therefore, even if it reached the Nitra valley in Nové Zámky, it likely did not possess the same destructive force as in case of downstream flood wave. Moreover, reports of the devastating impacts of floods in this region are exclusively dated to February. By early March 1876, the flooding was more associated with the lower-lying areas of the Danube, such as Budapest, where flooding persisted even on March 7 (PZ 8.3. and PZ 9.3.1876). By mid-March 1876 at the latest, the floodwaters in the inundated areas of the Danubian Lowland had fully receded and returned to their channels.

Conclusion and discussion

The commemorative marble plaque marking the flood on the Nitra River in Nové Zámky from 1876 was removed from the wall of the old building during demolition work in 1933. It originally belonged to the former Archbishop's Mill, located on the outskirts of the town. The plaque is currently stored in the depository of the Ján Thain Museum in Nové Zámky. Based on climatological assessments and analyses of historical documents, we determined that the flood most likely occurred between February 21 and February 27, 1876. This flood was part of a series of floods that affected the Danubian Lowland in Slovakia from February 21 to early March 1876, as well as broader areas in Central and parts of Western Europe, which experienced from mid-February to mid-April 1876. The primary cause of these floods was a warming period following a harsh winter, which led to snowmelt in the latter half of February. The presence of ice floes in rivers and the formation of ice jams also contributed to the flooding. The situation was further complicated by new rainfall.

Historical press reports indicate that floods in the Danubian Lowland (Slovakia) caused extensive damage. Dozens of towns and villages were inundated, with at least 46 settlements specifically mentioned. The actual number was likely significantly higher, as entire areas were flooded, including the lower part of Žitný ostrov and the right bank of the lower Váh River up to Komárno. The flood occurrence was concentrated mainly in the western part of the Danubian Lowland, which was also the primary focus of our sources of information about the 1876 flood, including the *Pressburger Zeitung* published in Bratislava and *Obzor* published in Skalica. Numerous houses were destroyed, such as ten in Horná Baka and Dolná Baka, several in Gabčíkovo, ten in Matúškovo, many in Sládkovičovo, and nearly 50 in Žihárec. According to another report in *Obzor*, 120 houses were completely destroyed in Sereď and surrounding villages due to flooding from the Váh and Dudváh rivers. Several mills were also destroyed, including those on the Danube and Čiližský Stream (in Horná Baka, Dolná Baka, and Gabčíkovo) as well as the Archbishop's Mill on the Nitra River in Nové Zámky. Two major bridges were destroyed — one on the Váh River in Komárno and another in Hlohovec — along with stored supplies of gunpowder and food in the military fortress in Komárno. The floodwaters carried away several ferries on the Little Danube and washed away timber stored along the Váh and Little Danube rivers. Many levees were breached or damaged, and roads were flooded in numerous locations. Some villages were cut off from the surrounding area for several days and could only be accessed by boat. In a few streets, movement was only possible by boat, and many fields in the region were inundated, resulting in livestock deaths. In some areas, inadequate water flow through narrowed profiles of engineered transport structures, such as road bridges (for instance, on the Dudváh River in Sládkovičovo) or culverts under railway embankments (near Pezinok), contributed to the flooding issues. Fortunately, no human casualties were reported in the Danubian Lowland according to contemporary press accounts. Positively, many individuals selflessly helped during the floods, and various public collections were organised to assist those affected. Newspapers published lists of generous donors. According to Horváthová (2003), the devastating ice floods of 1876 in several parts of Central Europe led to the establishment of water cooperatives tasked with flood protection.

Based on the knowledge gained about the extensive supra-regional impact, catastrophic effects, and prolonged duration of the floods in 1876, along with the information that the Archbishop's Mill in Nové Zámky was destroyed, we classify the ice flood — caused by a combination of snowmelt and, to a lesser extent, rainfall on the Nitra River — as intensity level 3 (the highest level). Unfortunately, we could not find more detailed information regarding the specifics of this flood on the Nitra River itself. The historical press focused more on the flood waves occurring on the Danube, where at least three flood waves impacted certain localities in a relatively short timeframe. While we have clarified the causes, damages, and timing of this flood, we can only outline its spatial occurrence within the broader Danubian Lowland area, as no other locations along the Nitra River were recorded in the documents.

The 1876 flood on the Nitra River is referred to as an ice flood. In recent years, the global extent of river ice has

been decreasing (Yang et al., 2020; Gorbachova et al., 2024). Ice phenomena on rivers are therefore less frequent, but they still require attention due to the potential for major damage.

According to the hydrological terminology dictionary, a flood mark is defined as a marker that indicates the water level and date of occurrence during significant historical floods, floods with catastrophic outcomes, dam failures, levee breaches, or other notable flooding events. Flood marks are placed on stable and permanent structures near the watercourse (such as bridge piers or historical buildings in towns) or on modified rock outcrops to ensure long-term durability. They are mounted on vertical flat surfaces for visibility (Makeľ and Turbek, 2002). The commemorative plaque that was previously located on the Archbishop's Mill in Nové Zámky does not entirely meet this definition, as the exact date of the peak flood and the specific water level reached at the structure are unknown. However, it does document the devastating effects of the flood, and we have identified its exact location and approximately determined the date of the peak. Therefore, this plaque could now be indirectly considered one of the extinct flood marks within Slovakia.

Acknowledgement

This contribution was supported by the APVV-20-0374 DETEKTIVES project and the VEGA grant agency, project no. 1/0245/23. We would like to express our gratitude to Mgr. Pavol Rusnák, a staff member of the Ján Thain Museum in Nové Zámky, for his assistance in locating the commemorative plaque related to the 1876 flood within the museum's collections. We also extend our thanks to Priska Feketeová and Bc. Cyntia Dujsíková for their help in studying archival documents from the István Kultsár Library (Danubian Museum in Komárno).

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