

PRACE GEOGRAFICZNE, zeszyt 107

Instytut Geografii UJ
Kraków 2000

Jan Munzar

SELECTED HISTORICAL FLOODS IN MORAVIA IN THE PRE-INSTRUMENTAL ERA IN CENTRAL-EUROPEAN CONTEXT

Abstract: It appeared after the disastrous floods in Moravia and Silesia in July 1997 that there are no data available from this eastern part of the Czech Republic, which would facilitate a comparison with flood events before 1900. A research was therefore started to study hydrometeorological extremes occurring in the Morava River basin from the 16th to the 19th centuries. This period of time is briefly characterized by summer and winter floods that occurred in selected five years and which are subjected to a preliminary assessment in the supra-regional context.

Key words: historical floods, Morava River watershed, Central Europe.

1. Introduction

It showed shortly after the disastrous floods in the eastern part of the Czech Republic in July 1997 (Munzar, Ondráček 2000) that there are no data from this part of the country available for a comparison with the historical flood events before 1900. It followed out from the hitherto studies that the floods are more frequently mentioned in the literature only since the 2nd half of the 16th century. On the other hand, the very first water gauge stations in the Morava R. basin was made as early as toward the end of the 70s of the 19th century, the series of the measurements being incomplete, however. The only available historical measurements to compare with the 1997 floods were the maximum discharge values measured since 1915 (at the Kromčříž gauging station).

This article aims at providing a preliminary information on the floods in the selected years from the period between the 16th and 19th centuries and to draw attention to both benefits and problems at investigating their causes, even those of the regional scale.

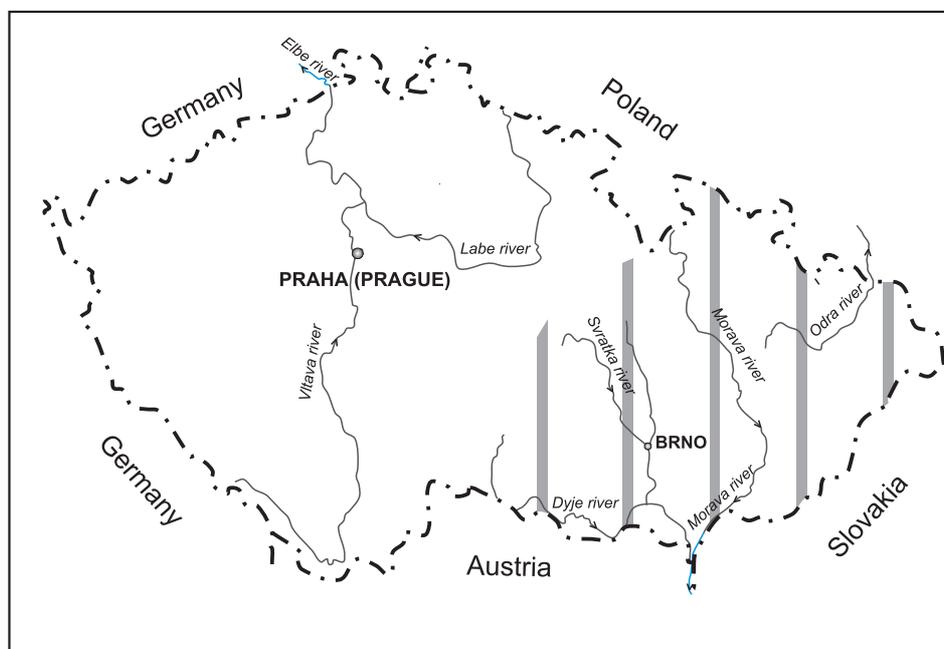


Fig. 1 Area under study – eastern part of the Czech Republic, constituted from historical lands Moravia and “Czech” Silesia (from hydrological point of view Morava River and/or Odra River basins).

1591

The floods are mentioned in the oldest preserved Czech printed paper concerning the issue which was published in Olomouc (Munzar, Kysučan 2000). According to the historical source the flood started in Prostějov on 10 July 1591 and lasted for 5 days; its reasons are not mentioned, however. In the second part of the print there is a description of a storm with the flood occurring near „Šymberk“ (most probably Šumperk) on 22 July 1591. Nevertheless, the town chronicles of the both settlements mention only one flood which was to have occurred somewhat earlier: it is being dated at 2 June in Prostějov, and at night from 21 to 22 June 1591 in Šymberk.

From the regional point of view the chronicle dates are supported by data originating from eastern Bohemia and from the borderland areas of Poland. The sources speak of a „terrible and heavy“ flood occurring in Hradec Králové on 24 June 1591 at about 12.00-13.00 o'clock on the two local rivers with that on the Elbe R. being more intense than that on the Orlice R. (Kotýza et al. 1995).

The Polish territory recorded a great flood on 22 June 1591 on the Nysa Kłodzka R. and Bystrzyca Kłodzka R. Another heavy flood was recorded on the Ścinawka R. (springing as the Stěňava River in NE Bohemia) on 23 June. The flood culminated

on rivers Bóbr (also springing out in the Bohemian territory) and Kwisá on 24 June 1591. However, the brief chronicle entries say nothing about the meteorological causes of the floods.

1598

There were two periods of floods occurring practically in the whole territory of the Czech Republic: the spring flood (before 17 March) resulting from the rapid thaw of a considerably thick snow cover, and the summer flood resulting from stormy and persisting rains (before 18 August). In addition, there were other floods in Moravia during the long-lasting period of rains in the autumn. A total of 5 floods were recorded near Brno to the date of 5 November 1598 and the annual balance of floods in the Dyje (Thaya) River watershed was 6 events (with precise dates not known).

The chronologically corresponding spring floods are documented also on the Elbe River in Germany. The wet August of 1598 is also confirmed to occur in Austria from 14 to 25 August with one flood on the Danube and two floods on its tributary Ybbs. In Poland, the persisting rains induced floods on the Nysa Kłodzka and Bystrzyca Rivers on 16 August and the towns of Kłodzko and Wrocław recorded high water in their vicinity on 24 August. The flood in Germany – on the Elbe R. in Dresden – is dated on 18 August (Munzar 1998).

1652

A chronicle from southern Moravia (Uherské Hradiště) mentions that the rains began on 7 July and lasted day and night until 21 July 1652. And then a flood arrived on the Olšava and Morava Rivers on 22 July. The two squares on the town were flooded and neither people nor carts could leave the town. A great flood in Frenštát pod Radhoštěm was recorded on the same day – 22 July – on the Lubina River in the Odra R. basin.

In harmony with these data is the entry made in *Theatrum Europeum* (Weikinn 1961) mentioning that the flood which arrived on 23 July 1652 after extremely heavy rains lasting from 18 to 22 July flooded the „whole country“ (i.e. Moravia), particularly around the town of Olomouc. It lasted 7 days and is said to have had finished as suddenly as it arrived. The July 1652 is also mentioned in two other records from the same source in connection with floods in the Odra River basin – both in Opava and Krnov on the Opava River, and in „the whole Upper Silesia“ where dams near Wrocław were broken at three points. The historical source speaks of the reason being a sporadically „horrible“ weather, especially during the first harvest.

In contrast, the summer of 1652 in Bohemia, i.e. in the western portion of the Czech Republic is being mentioned as a period of drought.

1784

The flood disaster in the watershed of the Main River after the severe winter 1783/1784, on the turn of February and March 1784 was successfully reconstructed

by Glaser and Hagedorn (1990). Decisive for its development was an invasion of warm air accompanied with heavy rains, which should have been related to the blocking high over central Europe. The extremely high flood wave resulted from the huge amount of water from the thawed snow and the water surface swelling due to ice.

As to the basin of the Labe (Elbe) River, the flood with ice culminated on the Vltava (Moldau) River in Prague on 28 February 1784 with the water level of 515 cm and the additionally estimated discharge of 4 580 cubic meters per sec – the record discharge that has not been broken yet. Except for Bohemia, the flood also impacted Saxony etc.

The eastern regions of the Czech Republic recorded an exceptionally cold winter with huge amounts of snow. Up to now, the flood was successfully evidenced only on the Dyje (Thaya) River when the villages near Znojmo were stricken by the proceeding ice on 28 February 1784 at midnight.

In Austria the Danube culminated on 28 February 1784 in Braunau and in Vienna.

1830

The winter of 1829/1830 is the so far not surmounted most severe winter since the beginning of air temperature measurements at about the end of the 18th century – not only in central Europe. The records speak of a considerable snow cover but this was insufficiently quantified. The end of the winter resembles the year 1784.

The Vltava River water table in Prague began to rise due to the oncoming warm spell and rain on 23 February. It culminated at night from 28 February to 1 March 1830 with the water level of 420 cm; the discharge was later estimated at 2 840 cubic meters per sec.

As to the course of weather before the flood, it apparently did not differ much from that in Austria where the warm S and W flow prevailed from 22 February 1830, which induced the thawing of a high snow cover in mountain areas of the Alps. The rain (arriving to Linz at the same time as to Prague first time on 23 February) contributed to an ever more rapid increase of the Danube water surface that was still frozen. The ice began to crack toward the end of February and the developing ice pack further supported the water table bulging. The unexpected water table culmination with the floating ice took Vienna by surprise again at night from 28 February to 1 March 1830 when the water mark reached 601 cm. The apparently greatest local disaster took the toll of enormous material losses and 74 human lives. The Danube near Vienna returned to its regular river bed on 4 March.

Its water table near the mouth of the Morava River opening into the Danube started to rise on 27 February 1830. The greatest danger of the population living along the lower reach of the Morava R. occurred at the daybreak on 3 March when the water table culminated with the simultaneous occurrence of a great amount of flowing ice. This corresponds well with the information from southern Moravia from where a great passage of ice is reported to occur on 3 March. The inhabitants of Austrian settlements Hof and Marchegg were rather lucky to see that the rise of the Morava River water level resulted in fact only by swelling from the Danube and no

synchronized culmination of the two water courses occurred (as in the case of the Bečva and Morava Rivers near Troubky in July 1997). The water table in the preponderant part of the Morava R. basin began to rise only some 14-21 days later, apparently under the influence of another atmospheric situation.

The thaw on the Svatka River in the Morava River basin set in on 13 March 1830 and the streams began to rise visually. In the town of Brno the Svatka R. culminated at night from 18 to 19 March and the water level of the second water course in Brno – the Svitava R. – culminated on 19 March 1830 when the extreme height of the past years was surmounted.

Floods on the Bečva River, the left tributary of the Morava R., were recorded in the period from 18-21 March 1830. On the Morava River itself the town of Kroměříž was put into the immediate flood jeopardy between 21-27 March. The culmination of the Morava R. at its opening into the Danube can be estimated at 23/24 March 1830.

The Polish territory records a heavy thaw on 28 February and 1 March 1830 when ice on the rivers opening into the lower reach of the Odra R. begins to crack. On the upper reach of the Odra R. the ice cracked in the section between the towns of Racibórz, Brzeg and Oława as late as on 16 March, and the ice passage got into motion in Wrocław on 17 March. Here the flood culminated on 23 March 1830 with the water mark at 743 cm. (The local gauging station was not prepared to take the measure so high and the scale had to be operatively added several inches in order to read the record value.).

2. Beginnings of Flood Warnings and Flood Regulation Measures

It was the consequences of the extreme ice flood from 1784 on the Elbe River in Saxony that led to the very first preventive flood protection measures in February 1785. According to the elector's directive, the messengers on horse backs operating on the Czech-Saxonian border were made obliged to announce to the population living on both river banks far into the inland any disruption occurring in the ice and any flood approaching from Bohemia. Similarly, there were the first preventive measure made in Vienna on the Danube River after the flood of 1784 that concerned for example a suitable location of foot bridges, preparedness of ships at the time of the flood danger, etc. Nevertheless, the heavy attack of water and ice in 1830 turned the existing and all later preventive measures into nothing.

The riding messengers were also in Prague on the Vltava River being obliged to deliver the warning from locations above the confluence of the Berounka River with the Vltava R. before the flood. The very first decree on measures to protect the population of Prague in the case of flood, issued by the town administrator was published in German and Czech languages on 29 January 1799. The instructions were soon tested in practice during the ice flood occurring from 21-26 February 1799.

The hydrological forecast service in the Czech lands came into existence in 1884. Its due alarms announced in the area of the upper reach of the Vltava R. made it possible to announce the state of emergency on its lower reach and on the Elbe River at the great flood at the beginning of September 1890. This helped to rescue properties whose price was considerably higher than the sum allocated by the Provincial Parliament for the service in all preceding years.

The hydrological service in Moravia and Silesia was established only as a follow up to the establishment of the Austrian Hydrographical Service with the headquarters in Vienna in summer 1893. One of its major works was a comprehensive instruction for the flood warning service on the Morava River in Moravia and Lower Austria, published in Czech and German languages in 1913.

3. Conclusion

The mentioned examples of the historical floods in the Morava River watershed occurring in the pre-instrumental times indicate that the sources of the written nature often contain valuable and irreplaceable information (e.g. the summer floods of 1598 and particularly of 1652 very much resemble the extreme floods of July 1997). It is to be assumed that the prepared comprehensive documentation on the occurrence of the historical floods will make it possible to draw the records of these dangerous phenomena back by more than 300 years into the past. This would provide a good link to analogical works from Germany, Switzerland, Austria and Poland and to the detailed documentation which is available for the western part of the Czech Republic.

Acknowledgements

This contribution was supported by Grant Agency of the Academy of Sciences of the Czech Republic (Grant No. IAA3086903).

References

- Brázdil R., 1998, *The History of Floods on the Rivers Elbe and Vltava in Bohemia*, Erfurter Geographische Studien, 7, 93-108.
- Deutsch M., 2000, *Hochwasserereignisse der Unstrut 1500-1900 (Befunde, Chronologie, Interpretation)*, Erfurter Geographische Studien, 8 (in print).
- Glaser R., 1998, *Historische Hochwasser im Maingebiet – Möglichkeiten und Perspektiven auf der Basis der Historischen Klimadatenbank Deutschland (HISKLID)*, Erfurter Geographische Studien, 7, 109-128.
- Glaser R., Hagedorn H., 1990, *Die Überschwemmungskatastrophe von 1784 im Maintal – Eine Chronologie ihrer witterungsklimatischen Voraussetzungen und Auswirkungen*, Die Erde, 121, 1-14.

- Girguś R., Strupczewski W., Rojecki A., 1965, *A Selection from Historical Sources of Unusual Hydrological and Meteorological Phenomena on Polish Territories in the 10th to 16th Century* (in Polish), PIHM, Wyd. Komunikacji i Łączności, Warszawa.
- Kakos V., 1990, *Fluctuations in the Frequency of Floods on the Vltava River in Prague in Relation to Meteorological Observations at Prague-Klementinum*, [in:] Brázdil R. (ed.): *Climatic Change in the Historical and the Instrumental Periods*, Masaryk University Brno, 319-322.
- Kotyza O., Cvrk F., Pazourek V., 1995, *Historické povodně na dolním Labi a Vltavě*, Okresní muzeum, Děčín.
- Munzar J., 1998, *Historical Floods in Bohemia and Moravia on the Example of the Year 1598*, *Moravian Geographical Reports*, 6, 2, 50-58.
- Munzar J., Kysučan L., 2000, *Floods in the Czech Lands in 16th Century Prints* (in Czech – English summary), *Miscellanea*, National Library in Prague (in print).
- Munzar J., Ondráček S., 2000, *Floods in July 1997 – The Most Destructive Natural Disaster in the Territory of the Czech Republic not only in the 20th Century*, *Erfurter Geographische Studien* (in print).
- Pfister Ch., Hächler S., 1991, *Überschwemmungskatastrophen im Schweizer Alpenraum seit dem Spätmittelalter – Raumzeitliche Rekonstruktion von Schadenmustern auf der Basis historischer Quellen*, *Würzburger Geographische Arbeiten*, 80, 127-148.
- Weikinn C., 1961, *Quellentexte zur Witterungsgeschichte Europas von der Zeitwende bis zum Jahre 1850*, *Hydrographie – Teil 3 (1601-1700)*, Akademie Verlag Berlin, 262-263.

Jan Munzar
Institute of Geonics
Academy of Sciences of Czech Republic
Brno
Czech Republic