



16-17 November 2023

STUDIES REGARDING THE CAUSING OF FLOODING ON THE HYDROGRAPHIC BASIN OF PETRIȘ VALLEY

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Abstract: Throughout history, humans have tried to change and shape their environment to meet their basic needs, such as food and shelter. Water has always had a special significance in human consciousness, and its perception since ancient times can be understood from two distinct perspectives: the continuity of life on earth and at the same time its destructive power. At the same time, water has also been perceived as an element with significant destructive potential, especially in terms of floods and the natural disasters associated with them. This perspective reflects the violent side of water, which can have devastating consequences when it gets out of control. This duality of water, as a source of life and as a destructive force, has given it a special place in myths, cultures and human thinking over the centuries. Thus, studies and research are carried out to understand and control environmental factors, which under certain conditions can be considered risk phenomena. In the present work, the conditions of flooding production in the Petriș Valley, located in the Mures river basin, a region characterized by geographical diversity and its significant impact on the environment and local communities, are investigated. This article provides a comprehensive analysis of the Mures river basin, highlighting the geographical features, relief, climate, and hydrological infrastructure surrounding it. It also discusses past extreme climatic events and measures taken to protect inhabited areas from flooding.

Key words: Flood, hydrographic basin, river, climatic events

• Introduction

Floods are natural phenomena that involve the presence of a significant amount of water, a short trigger interval and have a negative impact on society and the environment as a whole. In nature, the existence of sources that can rapidly generate a large flow of water, such as mountain glaciers, underground water levels, excessive snow accumulation during winter and upstream reservoirs with large capacities, contribute to the occurrence and spread of floods if adequate flood prevention measures are not taken. Floods usually occur in spring when the snow melts or after heavy rain. In recent years, however, they have occurred throughout the year and sometimes in repeated waves in the same areas. Although floods are predominantly natural in nature, environmental changes brought about by human activities, such as excessive urbanisation, massive deforestation and intensive economic, industrial and agricultural practices, are also contributing to the increasing frequency and severity of floods.

• Material and method

Located in central Romania, the Mures river basin covers the counties of Mures, Alba, Cluj, Bistrita-Nasaud, Harghita, Brasov, Sibiu, Hunedoara, Arad, and Timis. A vast region that is home to 16 municipalities, 23 towns, 303 communes, and 1,780 villages. With a total population of 1,877,642 inhabitants, of which 1,052,037 live in urban environments and 825,605 in rural areas, the basin is clearly a vital centre of Romanian life.

This flood defence network includes important works such as those at Reghin, Târgu Mures, and Ludus, as well as the damming of the Niraj and Târnava Mică rivers at Târnăveni. In addition to these, dams such as Zetea, Bezid, and Mihoesti were built for storage and flood protection. These are just a few examples of a complex network of hydrological infrastructure designed to ensure the safety of local people and their property.

The Mures River has a multi-millennial history and is known for frequent changes in its course, leading to the formation of beaches and islands, as well as lateral erosion of the banks, especially on the right and left banks. The average annual flow of the Mures at the entrance to the Petriș commune is about 142 mc/sec. In case of prolonged drought periods, the groundwater level drops significantly, which leads to strong drying of the soil and drying up of shallow wells (ȘMULEAC and ONGIA, 2013).

Avoiding flood amplification downstream: Ensuring that floods are not amplified as they move downstream. This may involve managing reservoirs to release water in a controlled manner and avoid flash floods (Tudor et al., 1968), (Neculau and Stan, 2016).

These actions are in line with the provisions of the Floods Directive, which promotes an integrated and coordinated approach to flood risk management at river basin level. This approach aims to prevent and reduce the impact of floods on the population, the environment and the economy (Tîșcovschi and Diaconu, 2004).

One of the significant characteristics that distinguish floods from floods is the time interval between the causal event (heavy rainfall) and the time when it occurs, as well as its duration (figure 2).

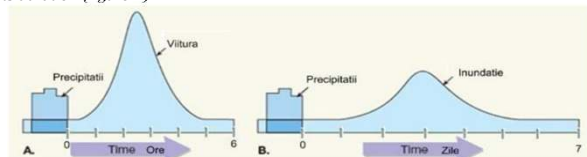


FIG. 2 The difference between floods and floodwaters

Flows represented in Tables 1, 2, 3 are of rainfall nature, reported per time and square meter. Floods form on the studied area in all seasons of the year, but most important in winter, spring and summer.

In the Petriș commune there are no flood protection works caused by the floods on the Mures river, but there are regularization works on the Petriș valley to limit the damage caused by the floods caused by the heavy rainfall in the Petriș valley basin.

• Conclusions

The Mures river basin is one of the largest and most important river basins in Central Europe. It covers the territory of three countries: Romania, Hungary and Serbia. The Mures River flows from the Hășmaș Mountains in the Eastern Carpathians for about 965 kilometres before emptying into the Tisa River.

From the research we concluded that the Mures watershed has the following hydrological characteristics, namely it is characterized by a variable hydrological regime, its flow is influenced by heavy precipitation, snowmelt and the runoff regime of its tributaries. In summer, the flow can decrease significantly and during periods of heavy rain or snowmelt it can increase rapidly, contributing to flooding.

The Petriș Valley is located in the catchment area of the Mures River, an area prone to flooding. The geographical characteristics of the Petriș Valley, such as the configuration of the terrain, the slopes and the limited drainage capacity of the Mures River in this area, can contribute to flooding during periods of heavy rainfall or sudden snowmelt.

Flooding in the Petriș Valley can have significant consequences for communities, infrastructure and the environment. They can lead to the destruction of homes, agricultural land and road and water infrastructure. Floods can also cause loss of life and affect water quality and the environment through contamination with chemicals or polluting materials.

• Results and discussions

The study of FLOOD PRODUCTION ON THE SURFACE OF THE PETRIȘ RIVER BASIN, in the years 2017-2021, was carried out based on the measurements made at the Petriș Hydrometric Station, located on the Petriș River, on the surface of the Mures river basin. The measurements of the different parameters necessary for the hydrological description are made according to the standard methodologies and on the basis. These measurements were made at the standard observation times of 06.00 and 18.00. During periods of high water the measurements were more frequent in order to anticipate special events such as floods and their propagation in the studied catchment (Guidelines for the work of hydrometric stations on rivers, 2014). Figure 3 shows the flows, monthly average, maximum and minimum values for the period studied. Figure 4 shows the values for the levels for the years 2021 and 2022. Monthly averages, maximum and minimum values are shown.



Figure 3 Monthly averages, maximum and minimum flow 2017-2022

Figure 4 Flood waves produced in 2017

