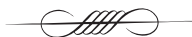


# *The Long-term Socioeconomic Consequences of the Tisza Flood of 2001 in Szabolcs-Szatmár-Bereg County, Hungary*

**Abstract** The extreme weather conditions caused by the climate change have strong impact on the everyday life of people. This study aims to analyse the changes in the life quality of those who live in the villages and towns affected by the 2001 floods in north-east Hungary. The study is based on statistical data and a survey conducted in nine settlements of the afflicted area. The floods had strong impact on the built environment and on local communities as well. According to our results, the majority of locals have experienced the negative effects of floods and had their homes ruined or damaged. The respondents experienced flood-related migration in the studied area and their impression was that mainly poor and unemployed people immigration to the studied area.

**KEYWORDS** quality of life, environmental inequality, floods, Tisza, disaster



## **Introduction**

The effects and impacts of climate change and natural disasters on society – including floods – are considered and discussed in details by international studies, such as CLEMENS-HIETALA (1999), CLUTTER et al. (2003), WALKER et al. (2003). Every natural disaster has various and severe consequences in human health – physically and mentally – and in the quality, health and completeness of built environment. Natural disasters endanger both the quality of life and the well-being of locals. The growing frequency and the effect of weather extremities in precipitation highlight the importance of floods and flood-borne inequalities.

The aim of our paper is to examine how and how much the great flood of 2001 changed

the quality of life in the affected region. The paper also ponders what kinds of intervention for indemnification were done and whether there were any life-threatening health risks or injustice in the compensation process. As the study area is situated in the least developed regions of Hungary (Figure 1), inequalities caused by geographical and environmental features have to be taken into account as well. In addition to the socio-economic status, the settlement structure is unfavourable; the vast majority of the settlements are small or tiny villages. In the first part of the paper, we give a short overview of the physical geographical features of the flood explaining what threats and risks a flood causes in the built environment. In the second part, we will analyse the results of a survey introducing how the locals adjudge the events.

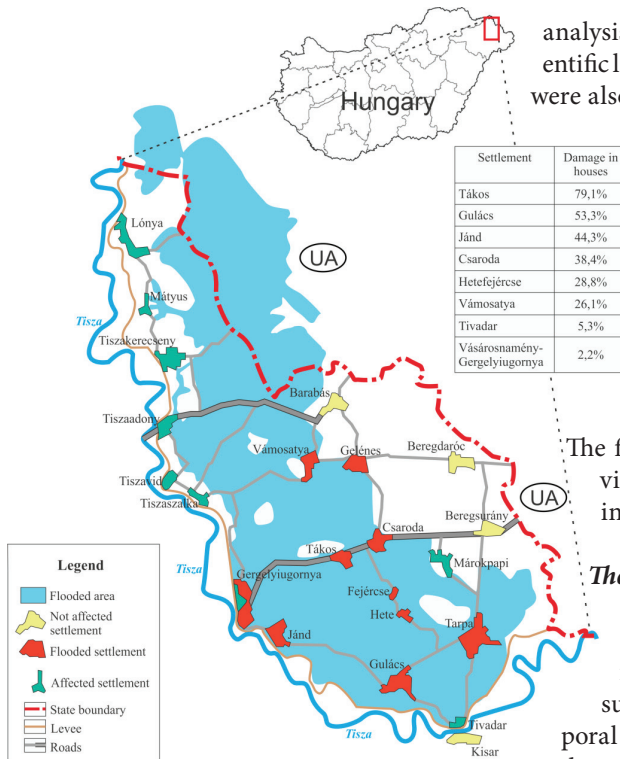


FIGURE 1 ❖ The flooded study area and the damage in the settlements caused by the flood. (edited: Nagy, Gy. based on KONECKSKY 2004)

**Study Area and Methods**

In 2001 nine settlements were partly or completely flooded and circa 1000 houses were destroyed in Szabolcs-Szatmár-Bereg County’s Bereg part. Thanks to the immediate response from the government, the damaged houses were rebuilt rapidly. Standard-design house plans were applied which offered better life quality for the locals, but resulted in conflicts.

The research used mixed methods to explore the long-term consequences of the flood and the governmental intervention. Content

analysis was made on media articles and scientific literature. Furthermore, statistical data were also analysed to reveal the outcomes. In the nine most severely affected settlements a survey was carried out (N=411) in the autumn of 2011. No specialised sampling method was applied; nevertheless, we focused on the most affected parts of each settlement. We had limited opportunities to draw comparisons between the settlements due to the small sample size in each location.

The first table shows the number of interviewed inhabitants and their proportion in the entire sample (Table 1).

**The Flood of 2001 in Bereg**

One of the many consequences of global climate change is the growing frequency of extreme weather events, such as the changing amount and temporal distribution of precipitation. Suddenly and rapidly pouring rainfalls lead to serious rise in the rivers’ water level. The shape of the catchment area can also augment the risk of floods which is unfavourable in the case of the Upper-Tisza, especially during sudden and heavy rainfall. As the catchment area is rather wide and short, tributaries should drain the flood from a sizeable area to a small section of the Tisza. Confluence of the main stem increases the water level easily and rapidly. In addition, the situation becomes worse, if the main river floods and the water of

the tributaries bloat which causes floods on the upstream. Because of the river control of the Tisza, the period of flooding shortened, but the water level increased. The water level can reach 8-11

Settlement	Sample size (N)	Share (%)
Csaroda	42	10,2
Gergelyiugornya	63	15,3
Gulács	61	14,8
Hetefejércse	17	4,1
Jánd	42	10,2
Tákos	20	4,9
Tarpa	115	28
Tivadar	15	3,6
Vámosatya	36	8,8

TABLE 1 ❖ Sample size and share by settlements (Source: survey)



PICTURE 1 ♦ Dam break in Tarpa. (Photo: [www.tarpa.eu](http://www.tarpa.eu))

m (MEZŐSI 2011) which also strengthens the negative effects of the unfavourable shape of the catchment area. Between 1998 and 2006 several water level records broke (RAKONCZAI 2000, 2002, 2011).

Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg are the most affected counties by floods in Hungary: after a heavy rainfall, the floods reach these counties in 12 to 36 hours (KONECSNY 2004), thus appropriate and quick response is needed which is not always possible.

In the last few decades several major floods took place: in 1970, 1993, 1995, 1998, 2001 and 2011. The flood of 1970 was caused by the Szamos river and ravaged the right bank of the Tisza. The flood of 2001 affected Bereg region (see Figure 1), caused nearly 15.1 billion HUF damage and the total recovery cost nearly 25 billion HUF (1025/2001. (III. 23. Government Decision). The damaged houses were

rebuilt and the morphology, the traditional folk architecture blueprints of the villages were preserved. Some settlements, e.g. Tákos were entirely rebuilt and renovated (see Fig. 2). The flood did not only hit the settlements and destroy the built environment, but it caused nearly 6 billion HUF loss in agricultural production as well.

The Bereg region is one of the peripheral regions of Hungary characterised by low income and low employment rate, fragmented and decentralised settlement structure with small villages. The vast majority of the flood-affected settlements do not have strong persistent power which is proved by decades of population decrease (BAJMÓCY et al. 2012, CSORDÁS 2001, KUN 2004). The affected area is part of the Vásárosnamény micro-region which is one of the 33 least developed micro-regions in Hungary as far as infrastructural,



**PICTURE 2** ❖ *Reconstructed house in Tákos*  
(Photo by Györki, A.)

socio-economic and employment indices are concerned. The rise from this unfavourable situation is impeded by floods that reduce touristic potentials by damaging infrastructure, cultural and built heritages, and causing negative image that decreases attractiveness. Not only the decreasing touristic potential, but the concomitant GDP loss is a burden for the whole region. These accelerate the underdevelopment which afflicts especially the lower socio-economic groups.

Several months before the flood of 2001 – the entire year of 2000 until February of 2001 – were characterised by deficient precipitation and low water level on the Tisza and its tributaries. However, the quantity of several months' rain fell in the upstream of the Tisza in early March of 2001. At the time of the flood the soil was still frozen, so neither infiltration, nor foliage reduced the amount of the water on the surface; the precipitation flew directly to the

tributary streams and to the Tisza. A sudden heatwave melted the snow in the Carpathians which raised the level of the flood. As a consequence, the water level growth reached 12 m within days in some gauging stations (KONECSKY 2004). In Ukraine several dam broke, and also in Hungary between Tarpa and Tivadar (Picture 1) the levee was unable to keep the rapidly increased amount of water. The flood level broke the record height, so the inhabitants of Bereg were evacuated (AMBRUSZ 2011).

After assessing the damages, the government decided to rebuild the settlements and to modernise the dam system. The houses were rebuilt following 17 traditional folk architecture blueprints (Picture 2.). In addition, the government offered compensation for the farmers, but the quality and the amount of help provoked fierce criticism (KUN 2004). The combined costs of defence against the flood, the reconstruction and the compensation were estimated to 60 billion HUF.

### **Flood-related Risks**

The flood does not only destroy built and natural environment, but it is also dangerous for the society, because it is a source of complex human health risk. For example, the poor drainage system can be biggest threat for the settlements: floods might wash out excrement from cesspits. Even if the remediation is carried out fast after the floods, the sporadic bacteria or nematode eggs are can survive for 100 days in the soil. At the time of the flood of 2001 only 63% of the homes in Vásárosnamény and 21% in Tarpa were connected to the drainage system; this index was 0% in the case of the other settlements (KUN 2004).

The poor quality of houses also causes disorders in human health. The sick building syndrome (SBS) (KREISS 1990) is mainly caused by the bleak environment, inadequate lighting, and overcrowded environment which affect the physical, as well as the psychical well-being of the inhabitants (PÁL – TÓTH 2007). Floods worsen the condition of poorly built houses with sodden walls which are perfect place for mildew. Lower class people often live in one-room houses where the air circulation is insufficient. The crowded rooms and steam from cooking increases humidity, air humidity over 70% of leads to mildew formation on the colder parts of the wall. The results of a previous study demonstrated that because of the combined effect of floods, inland waters and mildew growth the houses become uninhabitable, but the owners – due to their poverty – are compelled to live in the life-threatening buildings (NAGY – BÁN 2012). The mildew inside the houses doubles the prevalence of bronchitis and asthma (EMBER 2007, RUDNAI 2007). As it has been mentioned earlier, the research area is one of the least developed regions in Hungary according to socio-economic and infrastructural data. Health condition was also one of the worst in this region which is caused by the inadequate life circumstances due to peripheral position, unequal socio-economic

structure, and the unequal transition to capitalism (ILLÉS 1996, UZZOLI 2001).

Despite the fact that psychical conditions might influence physical well-being, this aspect is less emphasised in catastrophe-related researches, because it is less conspicuous than the spreading of illnesses or epidemics. In fact, the shock of a natural disaster is a lifelong trauma which can even worsen the situation of deprived social groups on the periphery; children, for example, might become aggressive due to such shocks. The trauma might contribute to the (re)production of the exclusion of disadvantaged social groups (ÚJVÁRINÉ HANDÓ 2009). Earlier researches prove that flood significantly increased the susceptibility to depression (REACHER et al. 2004, AHERN et al. 2005, MORGAN et al 2005).

In other words, it is not enough to examine the damage and reconstruction of the built and natural environment, or the socio-economic status (SES), but flood researches have to give a complex assessment of life circumstances and quality of life, and to focus on psychical well-being of people in the affected area as well.

### **Results**

Population decline was the main demographic feature for our study area after the flood during the period from 2001 to 2011. The flood had a major effect on the housing stock, as approximately 5% loss was observable in the Vásárosnamény micro-region. The destroyed house stock had a rate over 20% in several settlements; the highest rate was found in Csaroda (BAJMÓCY et al. 2012).

Results of the survey present even higher rate in the study that concentrated on the most affected parts of the settlements. More than two thirds of the respondents affirmed that their houses had been affected by the flood of 2001 or later. In most cases (57%) only small, repairable damages occurred, but in more than 40% of the cases the houses were destroyed or

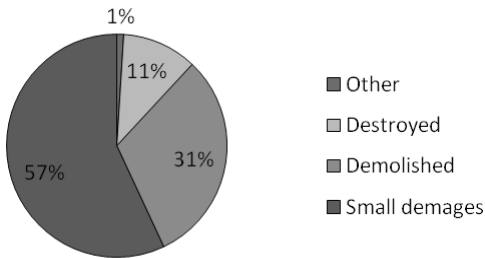


FIGURE 2 ❖ Type of damage in the housing stock  
(Source: survey, N=411)

had to be demolished due to the severe damages (Figure 2). Eighty-nine % of the harmed received help (financial or other aid) in reconstruction or renovation from the state, the local administration and in some cases from charity organisations, and the majority of the interviewed were satisfied with the quality of the service. Those respondents were the most satisfied who received help from the churches (it has to be noted that this was the smallest subgroup in the sample). The state-aid was rated above average, while the work of charity organisations was ranked lower.

As a result of the reconstructions following the flood, three quarters of the respondents lived in houses of the same or better quality than earlier. Thus, there is a sharp difference between those whose houses were rebuilt and those whose had been renovated. The former group thinks more positively about the housing stock, 70% of them rated housing conditions better than they had in 2001, while the latter group is less satisfied. Only 25% of those whose house were renovated and only 15% of those respondents who were not affected by the flood live in better housing conditions. Reconstruction and renovation improved the image of the settlements, two thirds of the respondents agreed with this statement.

In those villages that were mostly hit by the disaster, 29% of the respondents considered moving away, but their situation is complicated due to the low prices on the housing market. The houses are unmarketable at such a price that would be sufficient for buying another

one in a nearby city or in the capital. Therefore, some of the inhabitants are in a real estate trap. The construction of a new house in the study area costs approximately 15 million HUF nowadays, but they sell for 4-5 million HUF (BAJMÓCY et al. 2012). Therefore, some citizens own some houses as second homes. In addition to financial reasons, the most important reasons for staying are rootedness and familiarity with the surroundings.

Even if the majority did not move, many respondents knew someone who has moved away since the flood. According to our survey, the most popular destination was Budapest, followed by Nyíregyháza and Fehérgyarmat (the urban centres of the region). However, migration processes can be measured only by statistics, since the population structure has changed after the flood (Table 2). The participants think that mainly lower class people, poor and unemployed moved in. The most significant number of migrants comes from the neighbouring flood-affected villages.

According to self-assessment of the respondents, the majority of the sample belonged to average or below average income group (Fig. 3) and nobody in the two top categories which is not surprising, if we examine the socio-economic situation. The lowest mean can be detected in accordance with the income (Fig. 4).

Answer	Respondents (%)
Totally agree	49,4
Rather agree	13,4
Rather disagree	15,3
Disagree	15,3
No response / Do not know	6,6

TABLE 2 ❖ Do you agree or disagree that the flood had changed the population composition of the settlement?  
(Source: survey, N=411)

The self-assessment of health condition showed average values. One-ninths of the respondents ranked their health condition as the best, but almost all categories have the same proportions. Most of the interviewed ranked their conditions as average (5) on a ten-

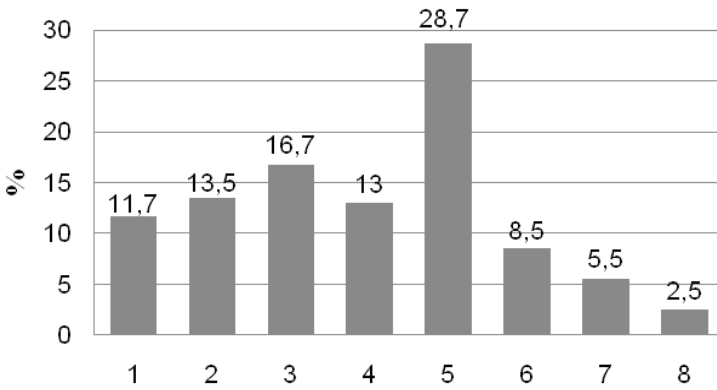


FIGURE 3 ❖ Please assess your income position in the society! (Source: survey, N=411)

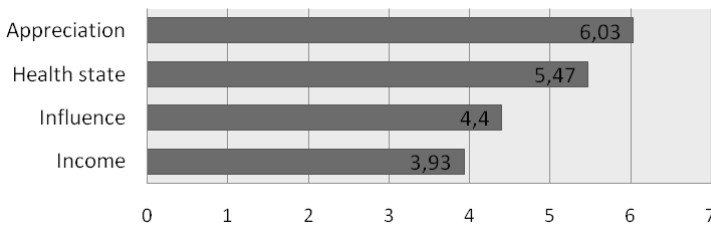


FIGURE 4 ❖ The results of self-assessment, position in the society (Source: survey, N=411)

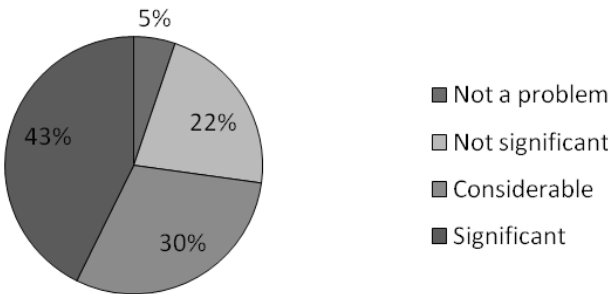


FIGURE 5 ❖ How significant threat is flood in the region? (Source: survey, N=411)

grade scale (15%). The income self-assessment has significant, but weak-medium correlation ( $r=0,335$ ) with the health condition assessment, mainly because the respondents rate their health condition better as their income level. Most of the interviewed (87%) did not recognise any floodborne illnesses or disorders, neither on themselves nor on their neighbours.

The disadvantaged social status can be

measured through social indicators, such as being beneficiary of aids or state funds. More than 40% of the respondents receive some kind of aid, most of them regular social care and disability pension. The high proportion of these two items might derive from the fact that the survey focused on the most flood-affected, thus the cheapest lands where people with the lowest social status live.

We also examined whether users – a common problem of poor and small villages – have appeared or gained influence, but the majority of the respondents gave negative answers. Yet, 26% confirmed that there are users in their villages. The usury increases the vulnerability and dependency of locals which reduces their social status and their chance of social mobility.

Although most of the participants thought that flood is a great risk in the region (Figure 5), they do not see a connection between the labour market and the flood (no significant correlation can be found between the answers). This means that the flood is rather a natural threat and not a complex issue from the locals' point of view.

Most people think that unemployment is inevitable and even if they searched for a job, they would not find one. Seventy-three % of the respondents think that flood is a danger for

everyone and they are vulnerable and exposed. Most of them expect solution from outside, 55% think that the state alone is responsible for preventing flood-threat and damage. In addition, people have positive experiences with cooperation, since most of them underlined their neighbours' role in prevention, reconstruction and other flood-related works during or after the flood.

The controversial approach to environmental issues can be observed in the answers for the question whether man can change or influence environmental processes. Eighty-five % believed it is possible, but only one third thought that human can control nature.

## Summary

As it has been mentioned earlier, floods have a complex effect on human well-being as far as health, life circumstances and quality of life are concerned. Moreover, floods have an impact on the real estate market, society and everyday life. However, respondents considered floods only as natural disasters and not as a potential threat to their physical and psychical health.

The peripheral position and centerless nature of the Bereg region is characterised by considerable outmigration, high unemployment rate and low labour activity. The lack of cooperation with Ukraine – as it is not an EU member in the present and it is not about to become one – reduces the chance for job creation. Social indices also affirm the disadvantaged situation of the region, since the proportion

of those who receive some kind of social care or aid is above the national average. More than 40% of the interviewed depends on state or local aid or found which proves the high social vulnerability. In addition, this region shows the worst health condition indices nationwide.

Despite the fact that reconstruction and assistance was immediate after the flood – and the actions taken were considered satisfying by the majority of the respondents, numerous locals decided to move away. The reasons for staying were the frozen housing market and low prices.

As a consequence of its low SES, the study area depends on external help. Flood prevention and modernisation of the dam system is financially demanding which the local authorities cannot finance. In the last decade the locals' exposure to natural disasters did not decrease, the vulnerability is permanent; moreover people are sometimes not aware of the threats and consequences. According to the results of the survey and the scientific literature, local residents are in a deprived and marginal position without the chance of social mobility. The environmentally unequal circumstances are some of the main causes of this unfavourable situation. \*

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