THE PERCEPTION OF FLOOD RISKS. THE RESULTS OF AN OPINION SURVEY IN THE GURGHIU BASIN

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ABSTRACT. The perception of flood risks. The results of an opinion survey in the Gurghiu basin. The study of floods perception by the affected or potentially affected Gurghiu basin population is among the few approaches in investigating flood-related risk perceptions in our country. In order to understand the quality and levels of perception of this type of risk, a specific survey was used (the applied method being that of the "expressed preferences"), whereby the population of the exposed rural centres was interviewed in connection with the possible flooding it had suffered, giving variants of questions / answers that ultimately highlight the degree of population impact as well as the level of information-assurance related to this type of risk. The survey consists of 16 questions and was applied to a sample of 226 persons with a stable domicile in 8 rural localities in the studied region. The structure of the survey includes elements about how flood perception is based on numerous factors, grouped into five categories: identification data, level of experience, knowledge and information, number of assurance, involvement of authorities, willingness to volunteer.

Key words: extreme water phenomena, floods, flooding, risk perception, assurance, survey, opinion poll.

1. INTRODUCTION

Floods fall into the category of extreme water phenomena with a high frequency of production in the Gurghiu Basin, generating significant material damage. In general, the causes of flooding in the studied region are the floods produced on the Gurghiu River and several tributaries (Tireu, Isticeu, Caşva, Orşova) as a result of abundant rainfalls (quantitatively significant, albeit of short duration) and melting of the snow layer. Floods usually occur in March, April, August and October (Neagu, 2012, pp. 110-112), being favoured by the land slope, but also by the lack of forest vegetation, which was replaced by deforestation on some slopes, making place for agricultural crops and pastures (the most significant floods, which caused major floods, were recorded in May 1970, July 1975,

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December 1995, August 2010). According to S.G.A. Mureş (apud Neagu, 2012, pp. 146-148), the floodable area that is considered at the level of the Mureş Water Basin Administration, through the flood defence plan, is the Gurghiului meadow between Zimți (Ibăneşti commune) and the confluence with Mureş River, plus a small area in the village of Lăpușna, as well as the floodplains of some tributaries (located within the communes of Gurghiu, Hodac, Ibăneşti and Solovăstru), the number of households and household annexes being likely to be affected by floods exceeding 200.

The high flood vulnerability of the Gurghiu Basin is highlighted by the positioning of most of the village centres on both sides of the minor gulfs of Gurghiu River and its tributaries, given the need for water for households since ancient times, the degree of vulnerability increasing with the increase of anthropogenic impact.

A specific survey was chosen (Sorocovschi, 2004, p. 137) through which the exposed rural population was interviewed in connection with the possible floods that it suffered, offering variants of questions / answers which, in the end, highlight the degree of population impact and the level of information/assurance related to this type of risk.

The study of flood perception by the affected or potentially affected population of the Gurghiu Basin is part of the research on the perception of flood-induced risks in our country, and other studies of this kind are drafted by D. Bălteanu et al. (2002), L. Floca and Diana Floca Reteşan (2002), S. Cheval (2003), I. Mac (2003), Iuliana Armaş et al. (2003), V. Sorocovschi and I. Mac (2004), V. Sorocovschi (2004, 2005), Oana Moigraddean (2005), H.-V. Contiu and Andreea Contiu (2005, 2006, 2007), Andreea Contiu (2010), Ioana Urcan (2012) and others.

2. DATA AND METHODS

The method applied was that of "expressed preferences", which uses the survey to enable the population in the analysed space to express their personalized level of perception and their priorities (Singly et al., 1998, Cheval, 2003, Sorocovschi, 2004).

To analyze the quality and levels of perception for this type of risk, a specific survey was used, which included 16 questions and was applied to a sample of 226 persons with a stable domicile in 8 rural localities in the studied region (Gurghiu, Solovastru, Jabenița, Hodac, Ibăneşti, Ibăneşti-Pădure, Dulcea and Tireu). The structure of the survey includes elements about flood perception based on numerous factors, grouped into five categories: identification data, level of experience, knowledge and information, number of assurance, involvement of authorities, willingness to volunteer.

The questions were put in the period November-December 2016 with the help of a group of 11th grade students from "Al. Papiu Ilarian" from Târgu Mureş.

3. RESULTS AND DISCUTIONS

3.1. Identification data

One of the factors with a decisive role in determining the perception of the analysed phenomenon is the distribution of households on relief steps. The persons interviewed, living in areas with a different degree of exposure to this extreme phenomenon (Figure 1), showed different perceptions, the dominant share being of those who have their households in areas of maximum risk corresponding to the Gurghiu meadows or of its tributaries: 65.3% - a risk assumed by the population concerned, part of the experience of flooding or inheriting a certain perception of this phenomenon from the ancestors, who have suffered in the past severe material damage. The rest of the households (34.7%) are situated on terraces and/or slopes, areas with lower risk - medium and low risk (19.6% on terraces and 15.1% on slopes respectively), a fact that can be observed from the superficiality of the answers.

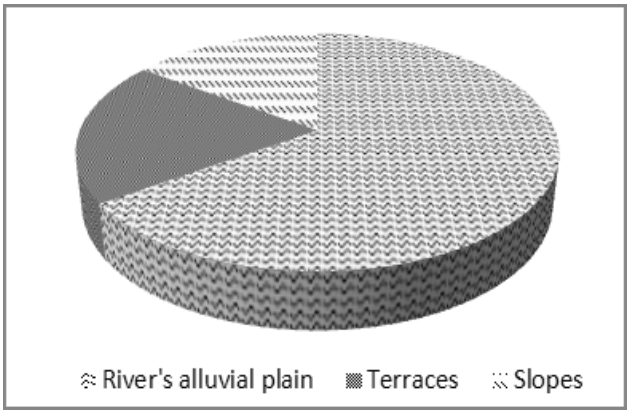

Fig. 1. Households' distribution by relief steps

The perception of extreme phenomena is a complex phenomenon, formed by the interference of several factors, an important role belonging to the social ones: age, gender, level of education, income, etc. (Cheval, 2003, Sorocovschi, 2004). The age of the respondents (Figure 2) depends primarily on the attitude towards extreme phenomena (in this case, the floods), with a more complex perception of the phenomenon studied appearing once with the increase and in close connection with the acquisition of more or less traumatic experiences, with more material damage or less significant. Three types of attitudes are present: passive, preventive and active (Pandi, 2002), depending on the degree of

supportability and flood defence actions, including river banks consolidation and dike constructions. Over half of respondents (57.5%) are under 60 years of age, with the largest groups being 41-50 years of age, and the group of 61-70 years old, holding 23%, respectively 22.1% of the total.

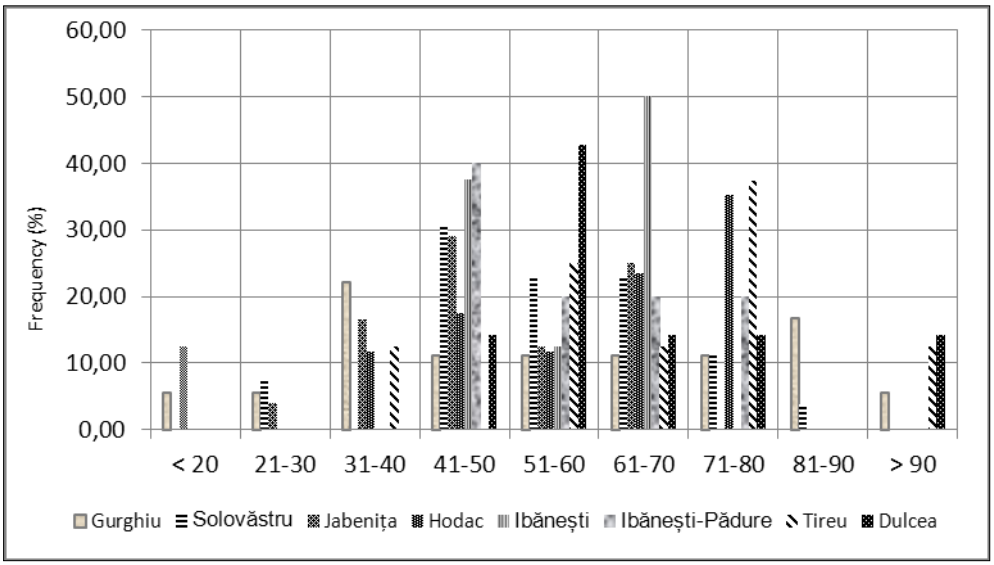

Fig. 2. Subjects' distribution by age groups

According to the gender structure of the interviewed population (Figure 3), there is a slight predominance, at the level of the studied region, of the male population (54%), compared to the women (46%). Decomposed on subcomponents (rural localities under study), the share distribution becomes more heterogeneous, with the largest differences occurring in the upstream localities, where the male population is dominant.

Another factor influencing the perception of floods in the investigated space and the behaviour during its development is the people's level of training (Figure 4). The survey looked at all social categories according to schooling: 4 grades (8%), 8 classes (27.4%), vocational school (22.1%), high school (24.8%) and higher education (17.7%). It can be noted that the majority of the interviewed persons have an average level of education, the share of the graduates with higher education being reduced (in the conditions of application of the survey in rural areas).

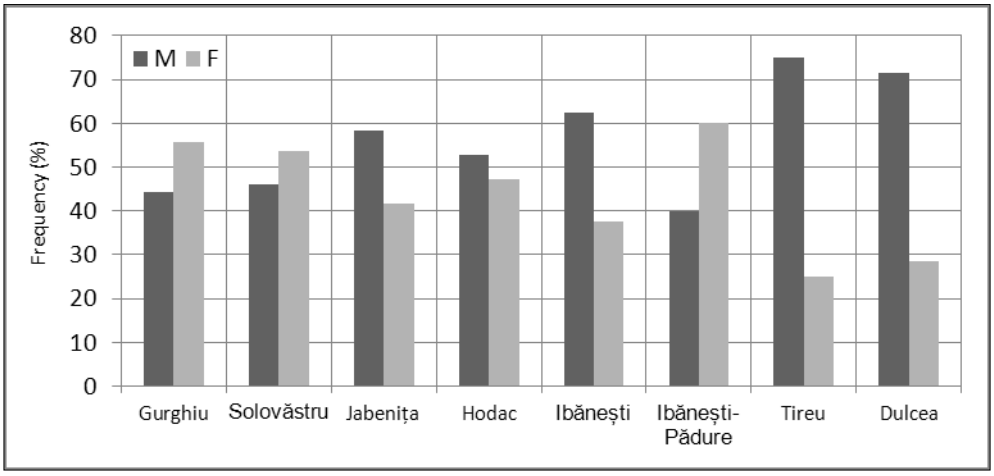

Fig. 3. Sex structure of interviewed population

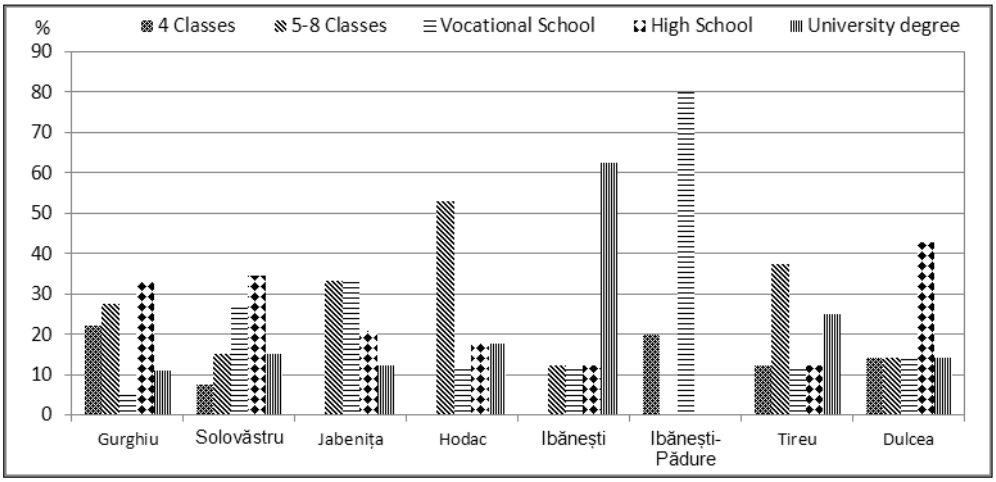

Fig. 4. The level of training of the interviewed subjects

3.2. The level of experience, knowledge and information

The experience gained over time, based on a direct knowledge of the extreme phenomenon (floods), outlines the complexity of the perceptual act, favouring, by increasing the level of information of the population exposed to this risk, more accurate images of the likelihood of occurrence and the possibilities of reaction and/or prevention. One of the significant factors of information, especially in the absence of personal experience, is the media, which can influence either by exaggeration or by minimizing the individual or collective perception of the

consequences of extreme phenomena (Sorocovschi, 2004; Contiu, Contiu, 2007), resulting in various opinions and actions, more or less anchored in reality.

Out of the total of respondents, 46% said they were affected by floods and suffered material damage, and the remaining 54% did not suffer from such extreme phenomena. In view of this situation resulting from the statistical processing of data at the level of the entire studied region, there are differences in the 8 localities (Figure 5), the highest share of the population that suffered significant flood damage was situated upstream, where the sample of the elderly population was higher (the population with a higher level of experience), mentioning the localities Dulcea (85.7%), Ibăneşti-Padure (80%), Hodac (76.5%) and Ibăneşti (75%).

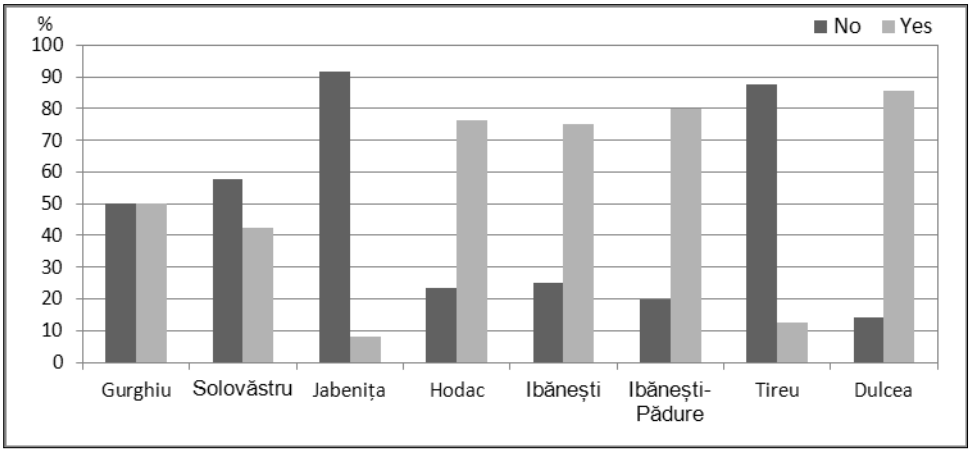

Fig. 5. Subjects' experience with flooding
(answers to the question: „Have you been affected by flooding?")

The impregnation power of floods in people's memory is highlighted by the fact that 60% of those affected by the floods have said they can accurately assess the month and year (in some cases even the day) when it occurred and they suffered from the floods: May, 1970. Here is, on his own initiative, the declaration of a person (who wanted to remain anonymous) who was affected by the floods at that time, proving a high degree of information, civic spirit and involvement, memorizing the events of the day of May 13, 1970: "My house has not been affected, but all the surrounding houses have suffered. The foundations are tall, so the water has not destroyed the interior very much, but the exterior walls, stables and other courtyard goods have been affected. I remember how I helped evacuate people and animals. Several tractor with trailers have been made available by the authorities to evacuate them. At that time the land we had near the banks was completely flooded and the water destroyed everything we succeeded to plant. "

Of those who said they were not affected by the floods, the maximum percentage belongs to those under the age of 40 who have the most indirect knowledge of the floods of May 1970 and July 1975. On the other hand, regardless of age or gender, most non-flood-affected people have their stable households situated on terraces or slopes and do not have farmland in river beds.

Risk communicators influence, through the correctness of the material they transmit, the individual or collective perception. Thus, the meteorological and hydrological forecasts aim at warning the population about the extreme phenomenon, specifying the timeframe in which it will occur and its spatial expression. The effect of checking this information in the media by the affected or potentially affected people may be particular in terms of the quality of perceptual capacity, the habit of checking weather forecasts may play an important role in reducing the adverse consequences of such an extreme phenomenon (Sorocovschi, 2004 Contiu, Contiu, 2007).

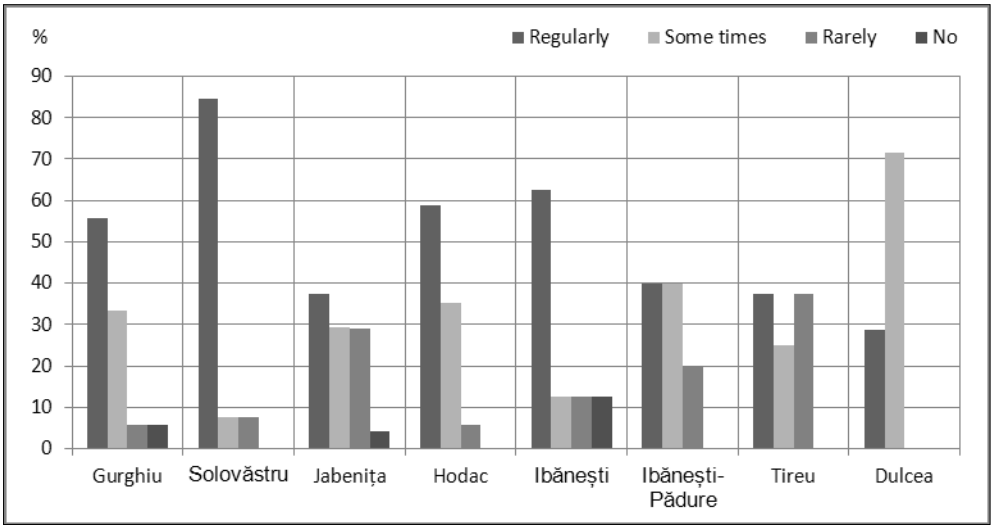

Fig. 6. The frequency with which meteorological and hydrological forecasts are pursued (answers to the question: „Do you watch meteorological and hydrological forecasts?”)

In the studied region, the highest percentage belong to those who check meteorological and hydrological forecasts (55.6%) and the lowest, the indifferent ones, which do not check them at all (2.6%); “sometimes” represents 27.4% and “rarely” 14.4%. The situation is nuanced at the level of localities (Figure 6).

To the question, "Are you willing to leave the locality/region where you live in case of a flood?", 23.4% responded "only at the recommendation of the authorities," with only 12.7% preferring to face the danger; most of them (45%) would leave home on their own initiative (Fig. 7, 8), proving responsibility and realism.

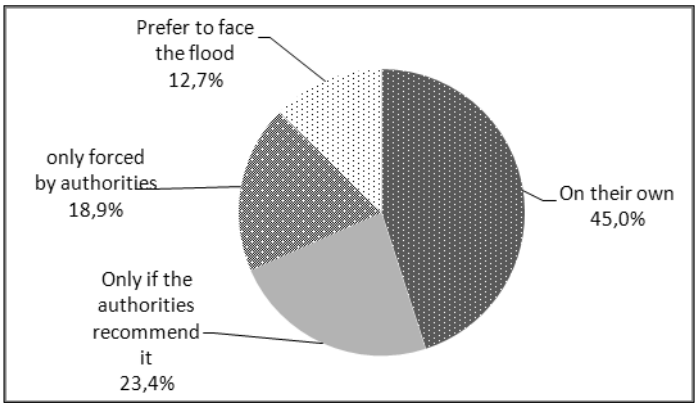

Fig. 7. Availability of subjects to leave the locality or region where they live in case of floods

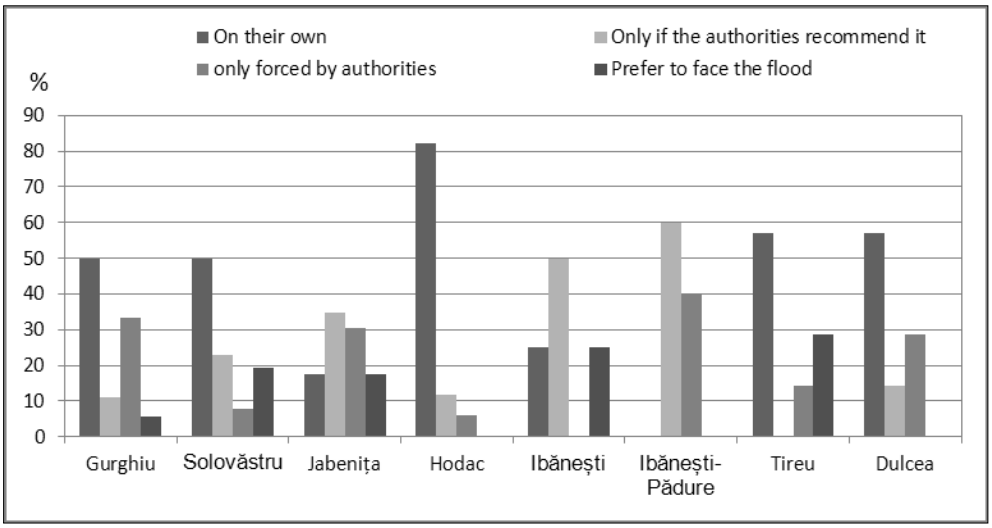

Fig. 8. Frequency at local level of the availability of subjects to leave the locality or region where they live in case of floods

The responses were closely related to the age, gender, experience and information of the interviewed subjects. Thus, most of those who would be willing to leave only on the recommendation of the authorities are aged over 60, more than half being female, due to the difficulties of leaving everything they earned in life and start again from the beginning; the same response was also offered by a few young people, probably out of bravado or insufficient knowledge of the risks to which they are subject.

3.3. Perception of the causes that generated and amplified the floods

Depending on the level of experience, knowledge and information, can be explained the subjects' answers for the causes that generate or amplify the effect of the floods. As expected, the percentage of rainfall associated with snowfalls (55.7%) is high, with the remaining 44.3% mentioning only the high rainfall. Interestingly, no respondent mentioned as a cause of floods the bridges obturation and the clogging of the ice, situations otherwise encountered in the region.

3.4. The perception of authorities' involvement in flood prevention and damages mitigation

To capture the way authorities are involved in preventing, combating and mitigating flood damage, five questions have been addressed (Questions 11-15 of Annex 1). An extremely small percentage is based only on the

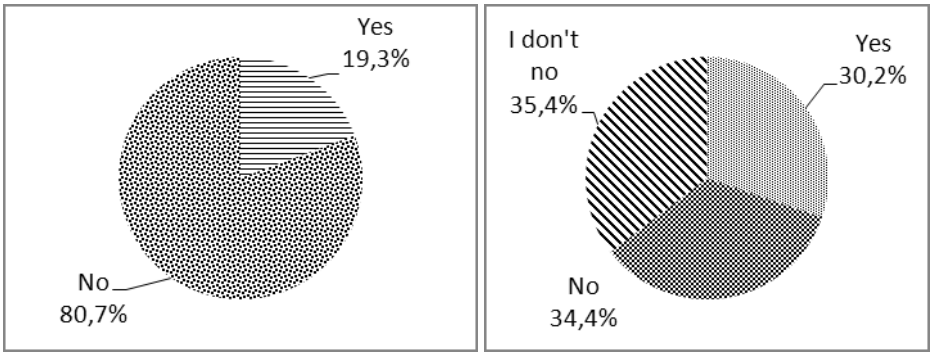

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Fig. 9. The perception of authorities' actions in floods prevention
(a, answers to the question: „ In case of floods, do you rely only on the authorities' intervention, or do you also contribute?"; b, answers to the question: „ Do you consider that the authorities do everything to prevent floods?")

intervention of the authorities (19.3%), the vast majority (80.7%) declaring their intention to contribute personally to the actions taken by the authorities (Figure 9a). As a matter of fact, about one-third of the respondents consider that the authorities do not do everything they can to prevent floods, another third also say they do not know what measures have been taken or are taken by the authorities in this regard, being imposed at the level of the entire region, a better coverage of this problem (Figure 9b).

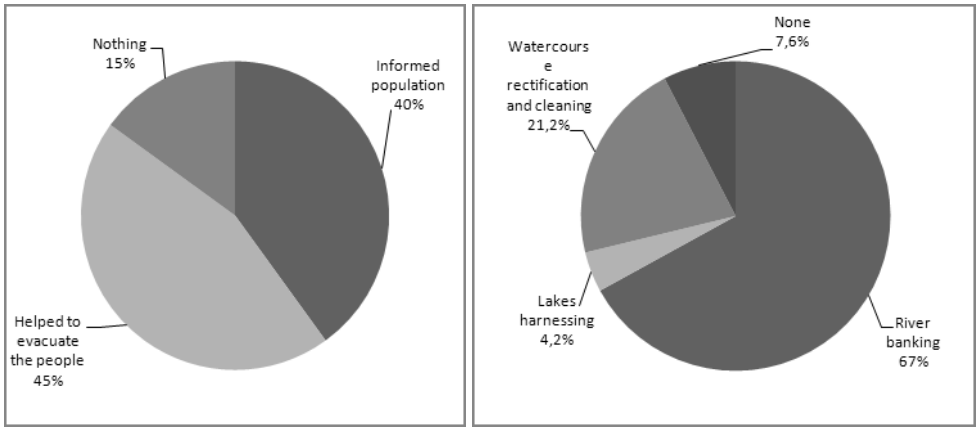

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Fig. 10. A. Measures taken by authorities to mitigate damage; b. Action taken by authorities to prevent floods

Regarding the perception of the interviewed population on actions taken by authorities to prevent floods, most of them (67%) specified the dikes, followed by actions of cleaning and straightening the watercourses (21.2%), only 7.6% saying the authorities did not take any action to prevent floods (most of them from Hodac, 41.2% of those interviewed) (Figure 10b). The surveyed subjects pointed out that, in order to reduce flood damage, the authorities helped to evacuate the population (45%), informing them accordingly (40%), 15% claiming they did not take any measures (Figure 10a). However, only 33.4% said they had benefited from the flood damage, 66.6% responding that they did not receive any aid (most of them from Hodac, 46.2% of those interviewed).

3.5. Assurance level in case of floods

The level of flood assurance analyses the degree of information and concern of citizens in this respect and raises the issue of preparing the exposed population to this risk phenomenon. Of the total of subjects, only 58.9% said they were assured in the case of floods, with the remaining 41.1% lacking such assurance either due to lack of adequate income (as some subjects stated) or indifference or ignorance. Ensuring people and goods in flood-prone areas is a non-structural prevention measure used by other European countries, but unfortunately, the population interviewed, in consensus with national reality, ignores it. Among the solutions that are required, education is a priority.

4. CONCLUSIONS

Although in our country, the shortage of studies related to the perception of natural hazards in general and floods in particular, was signalled more than 15 years ago (Cheval, 2003, Sorocovschi, 2004); it is further noted that these are few and punctiform like, the development of models to help correct the perception of the exposed population is still far away (Conțiu, Conțiu, 2007, Conțiu, 2010). In order to prevent and combat the effects of floods in the region under study, public awareness of the correct perception of these extreme phenomena and the responsibilities that are required at individual or collective level (implicitly, local, regional and national authorities) must become a priority. Such actions to explore the perceived risks of an extreme phenomenon (floods) undertaken with high school pupils and students are meant to encourage and empower them; to encourage in the future concrete interventions through active participation (of all actors involved) in flood prevention while at the same time increasing through education and empowerment the share of those who are willing and participating in volunteering (currently, 65.2 %). Harmonious integration and the sustainability of the relationship between the community and the environment cannot be achieved in the absence of adequate education in this respect.

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Annex 1

Survey for the flood perception in Gurghiu Basin
(after V. Sorocovschi, 2004)

Name and surname

1. Domiciliul home

2. Age

3. Sex

4. Studies: 4 classes, 5-8 classes, vocational school, high school, higher education)

5. Have you been affected by floods?

- No
- Yes, several times
- Yes, with material damages (goods, arable lands, pastures, animals)
- Yes, with material damages and injures
- Yes, with material damages and dead

If the answer is affirmative, specify the following things:

- river, stream
- year, month

6. Do you watch meteorological forecasts?

- No
- With regularity (almost daily, as much as I can)
- Sometimes
- Rarely

7. In case of flood, do you know how to act? How about after the flood has ended?

- Yes
- No

8. Are you assured for floods (yourself, your family and goods)?

- Yes
- No

9. If it is made a report of high flood probability for your locality/region, are you willing to leave your locality/region?

- Of own initiative
- Only at the authoritiess' recommendation
- Only forced by the authorities
- I will try not to leave my house, even if they intervene by force; I prefer to confront the flood

10. What are the causes that amplify the flood?

- High rainfalls
- Snow melting
- Rainfalls and snow melting
- Bridges obturation
- Clogging of ice

11. In case of floods, do you rely only on the authorities' intervention, or do you also contribute?

- Yes
- No

12. What are measures taken by the authorities to reduce the damages?

- They informed the population
- They helped to the population evacuation
- They did nothing

13. Do you consider that the authorities do everything to prevent floods?

- Yes
- No
- I don't know

14. What are the actions made by the authorities to prevent floods?

- Dikes
- Lakes harnessing
- Cleaning or straightening of water courses

15. Have you received financial support for the damages caused by floods?

- Yes
- No

16. Are you willing to participate in volunteering activities (dikes construction, cleaning of river bed, bridges repair)?

- Yes
- No