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**RISK OF FLOODING - ACTIVITIES, PARAMETERS AND
REGIONAL PECULIARITIES (Case Study: Varbitsa
Watershed Basin - Bulgaria)**

Abstract: An overview of the activities overtaken during risk of flooding situations, in one of the more often flooding region - the watershed of Varbitsa river (Southeastern part of Bulgaria) - has been performed. The main cognitive parameters for risk perception and risk definition, depending on regional, social and historical factors have been examined. The existing information and instructions for mass media communication in relation to the process of interaction in a disaster situation have been discussed. In connection to determination of the risky segments in the basin and plans for announcement, the prevention communication measures have been outlined. On the basis of the Bulgarian normative legislation, the activities concerning organization of communications in a risk-of-disaster situation and mutual aid between authorities, which are part of the Integrated Help System have been indicated. It has been accented on the necessity of a more effective realization of the action plans during natural disasters and especially flooding, in order to improve the partnership between authorities and participants in the communication process during risk-of-flooding situations.

Key words: risk of flooding, regional peculiarities, Varbitsa river watershed, communication process

Апстракт: У раду је дат преглед активности предузетих током поплава, у једној од често плављених области – речној сливу реке Варбица (југоисточни део Бугарске). Испитивани су основни когнитивни параметри ризика као и перцепције ризика, дефиниције у зависности од регионалних, друштвених и историјских фактора су испитиване. Такође су узете у обзир информације као и упутства за медије везано за хазарде. Мере превенције су такође испитиване. У раду су истакнути и нормативи бугарског законодавства, активности везане за организацију комуникација током катастрофе као и помоћ власти, као дела интегрисаног система за помоћ. Посебно је истакнута потреба ефикасније реализације акционих планова током елементарних непогода, а посебно поплава, у циљу побољшања сарадње између власти и учесника у комуникационом процесом током поплава..

Кључне речи: ризик од поплава, регионалне особености, речни слив Варбитце, процес комуникације

Introduction

The global warming is expected to increase the magnitude and frequency of extreme precipitation events, which may lead to more intense and frequent river floodings. In recent years, Europe suffered over 100 major damaging floods, including the catastrophic floods along the Danube and Elbe rivers in 2002 (EEA, 2003). The floodings are the most frequent

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disasters caused by natural phenomena, which have occurred during the last years in Bulgaria.

The biggest number of floodings in Bulgaria occurred during the period 2005-2007. Considerable material damages were caused and human victims were also given. Thus, the perception of the risk of flooding, activities and regional peculiarities are of main importance for Bulgaria.

The current analysis of risk of flooding aims to clarify the people risk perception of flooding in one of the more frequently flooded region - the watershed of Varbitsa river (South-eastern part of Bulgaria) - relating to regional, social and historical parameters and activities that ought to be undertaken before and during flooding.

Communication process on the regional and national level

According to Directive (Directive 2007/60/EC), a '*flood risk*' means the combination of the probability of a flood event and of the potential adverse consequences for human health, the environment, cultural heritage and economic activity associated with a flood event. The risk analysts have a responsibility to convey their assessments to decision makers, who must determine what action must be overtaken in response to the risk that the analyst has characterized. The US Department of Health and Human Services (2002) defines *risk communication* as an interactive process of exchange of information and opinion among individuals, groups, and institutions; often involves multiple messages about the nature of risk or expressing concerns, opinions, or reactions to risk messages or to legal and institutional arrangements for risk management. Risk communication attempts to promote appropriate protective behaviour by those to whom the information is directed (Burton et al., 1993).

Through detailed understanding of the risk communication of flooding actualization of the tasks, a set of the community action plans for disasters management could be performed, as well as the changes in the approaches in the risk communication process between authorities and population concerning announcement and activities in flooding could be enhanced.

The risk communication process should be based upon analysis that identifies risk areas (geographical locations, in which the environmental extremes are expected to occur), and the groups of population and properties located in those risk areas. These analyses provide the basic data, upon which messages that describe the vulnerability of different population groups can be formulated. The assessment of possibilities of the authorities, which are partners in the processes of risk perception and information dissemination and their joint responsibilities in implementation of an adequate plan for disaster management, is an important step for protecting the population at a risk situation.

Risk communication is a two-way process with an active participation from both, the sender and the audience. Two main concepts of evaluation of risk perception are predominantly used: the first one is based on the so-called "intuitive" processes of risk perception and evaluation performed by individuals and/or groups (community) and the second - formal, technical processes of risk perception, which are mainly used by official authorities identifying a normatively defined acceptable risk (Plattner et al., 2006).

Fukuzono et al. (2006) accept the community-based approach as the key approach guaranteeing success in integrated disaster risk management. It concerns the participation of local people in the design and planned processes in flood risk management, particularly with respect to soft policy measures. A qualitative description of the main factors, responsible for individual risk perception is given by Fischhoff et al. (1978).

Lindell and Perry (2004) pointed out that the communication process model should be analyzed in terms of who (source of information) says what (message), via what medium (channel), to whom (receiver), and directed at what kind of change (effect) (Fig. 1).

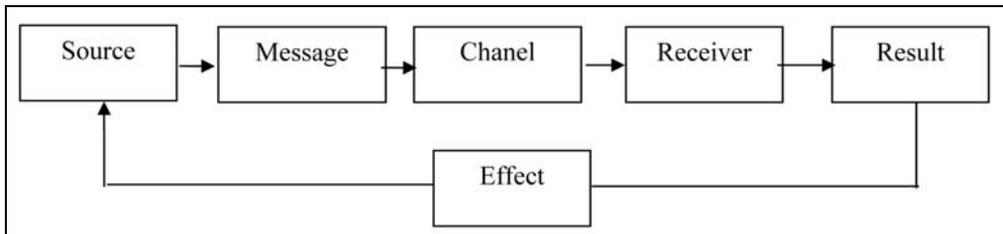


Figure 1. Schematic model of risk communication process

The process of communication could be provisionally divided into activities before, during and after disaster. The authorities have the responsibility to implement all activities regulated by normative legislation and/or guidelines on a national and regional level.

In the frame of the Law for protection during disasters (2006), the national programme for protection during disasters and yearly Action plans for their implementation has been developed. These plans are available community, district and national levels. The plans consist of analyses of possible disasters, prognoses for their consequences and the required measures for their decreasing. A substantial part of these plans is devoted to the way of interaction between the authorities of the executive power, as well as the order of keeping timely informed the population.

Risk communications during disasters and particularly flooding is included in the Single Life-Saving Integrated Rescue System in two sections - warning and announcement. The regional directorates of the Civil Protection National Service Directorate coordinate the development of the regional Action plans.

An earlier warning and announcement for flooding on the territory of the Varbitsa watershed basin is performed on the base of data obtained from the following institutions: the National Institute of Meteorology and Hydrology (NIMH) at the Bulgarian Academy of Sciences, the National situation center at the Ministry of Emergency Situations and the River Basin Directorate "East Aegean sea" - Plovdiv. The information reaches the owners and users of the hydro technical appurtenances through the Civil protection national service. They are 11 micro-dams on the territory of the communities of Kirkovo and Momchilgrad. Examination of these water reservoirs and risky segments of the Varbitsa river are performed yearly and prescription and deadlines for elimination of the irregularities are being emitted.

Besides the current communication process during risk management of the natural disasters, the preliminary preparation and information of the population is of great importance. This preparation is performed in dependence of risky or age groups of people, or an employment basis - schools, administrative activities, public services, industry, agricultural or forestry activities.

General recommendations to the population, which should be acquainted and followed, concern recognition of the risky zones, which might be flooded by high waters of the Varbitsa river, as well as the shortest and safest pathways for evacuation from these zones. The Law for protection during disasters presumes that the authorities of the executive power, public services and population are trained in defence against disasters. The training of population is dedicated to the behaviour and ways of action and implementation of the essential measures for protection. The population training is voluntary and is organised by the mayors of the municipalities.

The *communication proces during* disaster of flooding are governed by the Mayer of municipality. This process includes coordination of life-saving and urgent emergency-reconstruction activities. For that purpose, the headquarters could be established in order to exchange the information with the operational communication-information center of the Ministry of Emergency Situations, to coordinate the emergency help of the harded persons and reconstruction activities, that of the voluntary drafts and in case of necessities to announce the state of emergency on the territory of the municipality.

Population responsibilities during flooding consist in acquainting with information, received through radio and TV channels, National Civil Protection Service Directorate about risks and activities.

The communication after disaster is performed by National Civil Protection Service Directorate. The municipalities participate in the determination and assessment of the damages and management of the reconstruction, including help to the affected population. On the government level, an inter-institutional commission to the Council of ministers works for recovery and helping the population.

For the implementation of the Law for protection during disasters (2006) the National system for management at crisis is developed. The communication-information centers are established in each of the 28 regional directorates of Civil Protection. For the survey, analyses and assessment of the risk and early warning systems are established and maintained.

The established Life-Saving Integrated Rescue System for disaster defence includes General Directorate National Civil Protection Service of the Ministry of Emergency Situations, National services of Fire safety and population defence. The coordination between the constituents of the Life-Saving Integrated Rescue System is accomplished through communication-information centers at the Ministry of Emergency Situations.

Parameters of risk perception and determination

Perception of risk is a subjective judgment that people make about the characteristics and severity of a risk especially in terms of natural hazards (Slovic, 1992). A decrease of losses from natural hazards directly depends on the measures, that the population undertakes, which to a great extent are influenced by the risk perception. In contrast to the other threats, for example car accidents, the risk of natural desasters is more difficult to understand. The risk of natural desasters includes natural factors as well as its individual perception. Fischhoff et al. (1978), Slovic et al. (1980, 1985) suggest an "expressed preferences" approach, which uses questionnaires to ask people directly about their perception of risk. In these questionnaires the people are asked to rate the risk, associated with the various steps of hazardous activities, substances and technologies. Verbal reports as a way for risk perception characterization are also useful (Tyszka, Goszczynska, 1993).

In the frame of the research implementation, 40 people from different groups have been included in an inquiry concerning perception of risk of flooding. They live in the settlements in/around the Varbitsa watershed. Besides, two more specialized questionnaires were given to 17 employees at the State Forestry Agency and to 7 municipal officers. The questionnaires were anonymous.

Table 1. Data for settlements, where the inquiry has been performed and evaluation of the threats of flooding given by the inquired people

Location of the settlements		
- In the area of the watershed	Number	35
- Near the watershed		3
- Not mentioned		2
Living in the settlements, which are threatened by flooding (according to their estimation)	%	52,5
Affected during flooding	Number	2

The results from the performed inquiry among the population exhibit that the developed recommendations to the population concerning risk of flooding are not well known by 65% of the inquired people, only 20% are informed and the rest of 15% are superficially informed. The training courses concerning activities at risk of flooding have not been passed by 82.5% of the questionnaires. A very high percent of population (87%) is not well informed for about the risk of the flooding. Almost half of the inquired (about 42%) consider that the population of the given settlement is not informed how to proceed during flooding. More than 70% have responded that training for activities to be overtaken in risk of flooding situations in the schools is insufficient.

The results of an inquiry performed with public and municipal officers show that communications between Municipality, Civil Protection National Service Directorate and population is well established and it supposes an implementation of the Action plans at risk of flooding in time. The communication between the Regional Forestry Directorate of the State Forestry Agency, Civil Protection National Service Directorate and Municipality was assessed as good to moderate (82% of the inquired) and between Regional Forestry Directorate and media - as well (60% of the inquired). The organisation of annual workshops with participation of the authorities has been suggested.

The Regional Directorate of the National Civil Protection Service assesses the communication between them, on one hand, and the population, and the Regional Forestry Directorate and Municipality, on the other hand, as good. The technical equipment for announcement and communication has been evaluated as good. It was recommended to ensure up-to-date technique. In spite of that, the well-established approach for communication assists the fulfilment of the activities, set in the Action plan for management at risk of flooding.

The Regional Directorate of the National Civil Protection Service considers that the explication of the activities about the risk of flooding at the schools and enterprises is sufficient. The Directive of the European Council of Assessment and Management of Risk of Flooding (2007) is however, not known in details, the technical equipment such as road machinery and other type of equipment as well as human resources in the separate small communities are not sufficient for a fast and successful localization and solving the problems associated with flooding consequences.

It could be concluded that there is a disagreement in the opinions of the population and the officials at the Regional Directorate of the National Civil Protection Service about the training, information for threats of risk of flooding and activities during flooding.

The knowledge as a parameter for risk perception

Knowledge and beliefs about risk play a crucial role for the perception of risk (Viek and Stallen, 1981). Several studies have shown that provision of information about risk

changes the risk perception (MacGregor et al., 1994; Weinstein et al., 1990). Many people seemed to misperceived risks and because of that they underestimated the probability of harm or even denied that there were any risks (Slovic et al., 1974). Building on the concept of the bounded rationality (Simon, 1955), Slovic et al., (1977) argued that faulty of perception of risk could be explained as a result of the cognitive limitation of human beings. This is probably one of the reasons why 73% of the inquired people from the town of Momchilgrad and 55% from the village of Kirkovo has replied "yes" to the question "Would you like to receive more information about the activity of the National Civil Protection Service".

Trust and confidence as key parameter of risk perception

The confidence of the population is expressed in terms of the authorities and/or institutions carrying out the activities of risk perception and mitigating and subsequent behaviour responses. The social relationships and the corresponding public opinion about the risk is more dependent of the institutional performance (Rohrmann and Renn, 2000).

Due to this reason, to the phrase "I expect following official National Civil Protection Service measures from administrative bodies", about 14% from the asked from Momchilgrad and Kirkovo expect organizing the "public shelters", 25% are for "warning systems (sirens, messages via radio / TV, loudspeaker)". The majority of responders from the region of Momchilgrad show confidence to institutions, as 26% are for "a stronger attendance of the police", 17% - for a "constant information", 11% - for "the secure-information-centres". The percent-ages of the questioned from Kirkovo have been in the following proportion 10%, 30.5% and 14%. It was recognised that the issue of trusting in institutions, responsible for risk management, is one of the fundamental links between risk perception and risk communication (Royal Society, 1992).

The fear as a parameter of risk perception

The fear as a parameter of risk perception is mostly result of different risk characteristics, or due to experiences with flood events. The fear, in some cases, is getting out of control but in a real situation is unnecessary.

Social parameters of risk perception

Socio-economical peculiarities influence risk perception in terms of the point whether the natural disaster is accepted as a risk or it has been ignored (Douglas and Wildavsky, 1982). The individual responses to hazards are strongly mediated by social influences transmitted by friends, family and co-workers and respected public officials. Cutter (1993) clarified that cultural selection of risk was not linked to objective risk measurements or the physical reality of risk. Rather, the selection of risk reflected moral, political and economical positions, which are constructed in result of the cultural specifics of the population. For example, if the municipality has built an expensive infrastructure - the risk is collectively shared among a large number of the people. In contrast, the resident population, living in the villages or rural hoses, spread in the risky river watersheds independently face the risk (Olczyk, 2005). The results from the questionnaire performed support this tendency. The majority of asked (56%) answered that they are "safe" and "very safe" to the question: "How safe do you feel in your community/your personal environment?"

Regional and historical parameters of the risk perception

Regional and historical factors, determining risk perception of population associated with distribution of settlements in the area at risk, infrastructure, access to information about past events, and the role of institutions responsible for work in disasters and emergencies.

The vicinity of the town of Momchilgrad is scarcely populated. The majority of the population lives in cities. The region has many small villages, which are scattered over large distances one from another. The main population is represented mainly by three ethnic groups - Bulgarian (31%), Turks (62%) and gypsies (1%).

One of the most important areas of risk flooding investigations is the analysis of their historical chronology. It was found that information on the high wave of the river or torrent and its complementary characteristics about water basins in the region, collected in ages are suitable for the preparation of such analysis (Rannie, 1999). For the period, 1990 - 2001 in the watershed basin of the Varbitsa river 29 high waters events were registered. They provoked significant damages and 15 human victims due to flooding were given.

A significant number of high waters, causing floodings for the period of 2002 to 2007 have been registered. The most frequent damages are destruction of the road infrastructure, bridges, electricity network, water supply and communication systems, flooding of pumping stations, houses and farms demolition and losses of the agricultural production. The use of historical data assures identification of the risky areas of flooding and envisages the possible losses, in case if preventive measures were not been overtaken, for their restrictions. This kind of information ensures that risk estimations correspond to the municipality experience and improve the ability of their forecasting on the base of the frequency of the replication.

Conclusions

The main components of the communication process on the regional and national level have been reviewed. Existing legislation in our country for implementation of the activities in case of natural disasters is sufficient for an effective communication on both, national and regional levels, between the Municipality, the Civil Protect! on National Service Directorate and the population as well as for a realization of action plans at risk of flooding in the studied regions.

The results from the performed inquiry exhibit that the developed recommendations concerning the necessary activities at risk of flooding are not well known, the majority of the population has not passed the training courses and is not well informed about the threats of flooding. A certain disagreement in the opinions of the population and those of the officials from the Regional Directorate of the National Civil Protection Service has been documented. The authorities consider that the communication between them and the population is good and together with the available technical equipments for announcement there are good prerequisites for execution of the activities of the municipality action plans for risk of flooding.

The population of the studied region considers "knowledge" and "trust and confidence" as the main parameters for risk perception. The majority of people have confidence in the authorities and the responsible institutions in terms of communicating and managing the risk of flooding and would like to receive more information on effective and adequate civil protection measures.

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**РИЗИК ОД ПОПЛАВА - АКТИВНОСТИ, ПОКАЗАТЕЉИ И РЕГИОНАЛНЕ СПЕЦИФИЧНОСТИ
(На примеру слива Варбице у Бугарској)**

Главне компоненте процеса комуникације на регионалном и националном нивоу су обрађиване у раду. Постојеће законодавство у нашој земљи за спровођење активности у случају природних катастрофа је довољно за ефикасну комуникацију на оба нивоа, националном и регионалном, као и између Општине, цивилне заштите, Националне службе и становништва, као и за реализацију акционих планова у опасности од поплава у испитиваним областима.

Резултатити показују да препоруке које се тичу неопходне активности везано за опасност од поплава нису познате, већина становништва није прошла обуке и није добро информисана о поплавама. Одређена неслагања у мишљењу становништва и званичника из Регионалне дирекције. Националне службе цивилне заштите су документована. Власти сматрају да се комуникација између њих и становништва добро одвија и заједно са доступном техничком опремом постоје добри предуслови за извршење активности планова општине везано за акције ризика од поплава.

Становништво испитиваних региона сматра да су "знање" и "поверења" главни параметари за опажање ризика. Већина људи има поверења у власти и одговорне институције у смислу комуницирања и управљања ризиком од поплава, а желели би да добију више информација о одговарајућим мерама цивилне заштите.

