

## KATASTROFALNI RIZICI U BOSNI I HERCEGOVINI I SRBIJI SA POSEBNIM OSVRTOM NA POPLAVE

### CATASTROPHIC RISKS IN BOSNIA AND HERZEGOVINA AND SERBIA WITH SPECIAL FOCUS ON THE FLOODS

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#### REZIME

*Svjedoci smo sve učestalijih pojava prirodnih katastrofa kako u svijetu tako i na prostoru bivših jugoslovenskih republika. Upravo prirodne katastrofe postaju jedan od najvažnijih svjetskih problema u ometanju daljeg razvoja ljudske civilizacije.*

*Katastrofalni rizici javljaju se kao prirodne nepogode, ali i usljed djelovanja ljudskog faktora, ostavljajući za sobom ogromne materijalne gubitke i ljudske žrtve.*

*Ovi rizici imaju rastući intenzitet i frekvencije u globalnim razmjerama, pa su zbog toga jedni od ključnih prijetnji održivom razvoju u savremenim uslovima.*

**Ključne reči:** katastrofalni rizik, štetni događaj, faze upravljanja katastrofalnim rizicima, poplave, mjere zaštite.

#### UVOD

Svjedoci smo sve češćih pojava vremenskih nepogoda koje iz godine u godinu prozrokuju sve veće štete, ali i ljudske žrtve. Od ovih katastrofa nije pošteđen ni jedan dio svijeta, pa su zbog toga klimatske promjene i sigurnost građana u direktnoj vezi, a posljedice ovih katastrofa su različite u zavisnosti od preventivnog djelovanja i organizovanosti društva, ali i pravovremenog djelovanja državnog sistema, odnosno civilne zaštite, vodoprivrede, ekonomije, zdravstva itd.

Katastrofa je neočekivani događaj koji može ozbiljno ugroziti život i zdravlje ljudi i izazvati znatnu materijalnu štetu, a proglašava-

#### ABSTRACT

*We are witnessing increasingly frequent occurrence of natural disasters both in the world and in the region of the former Yugoslav republics. Precisely, natural disasters are becoming one of the most significant problems in disrupting the further development of human civilization.*

*Catastrophic risks, occur as natural disasters, as well as due to the effects of human factors, leave behind huge material losses and casualties.*

*These risks are growing in intensity and frequency on a global scale, and are therefore one of the key threats to sustainable development in modern conditions.*

**Keywords:** catastrophic risk, adverse event, stage managing catastrophic risks, floods, protection measures.

#### INTRODUCTION

We are witnessing increasingly frequent occurrence of weather disasters that from year to year, cause larger and more serious damage and human casualties. No part of the world is spared from these disasters, and that is why climatic changes and safety of citizens are directly related. The consequences caused by these disasters are different depending on the prevention and organization of society, but also on timely action of the state system, respectively civil protection, water management, economics, health, etc.

A disaster is an unexpected event that could seriously jeopardize lives and health of people and cause considerable material damage, and

va se kada bude jasno da raspoloživi resursi i fondovi nisu dovoljni za urgentan oporavak. Iako postoje različite vrste katastrofa, zajednički im je potencijal da prouzrokuju štetne efekte koji su u korijenu svake nezgode, nesreće i katastrofe.

Katastrofalni rizik možemo definisati kao rizik koji predstavlja pojedinačnu opasnost koja prijete velikom broju ljudi i velikoj imovini, a čije ispoljavanje ugrožava ne samo ekonomsku snagu osiguravača nego i društva u cjelini, odnosno njegovog dijela pogođenog ovim rizikom.

U nastavku će se govoriti uopšteno o katastrofalnim rizicima u Bosni i Hercegovini i Srbiji, njihovim vrstama, posljedicama, osiguranju, a posebna pažnja usmjeriće se na poplave kao prirodne katastrofe.

## POJAM I VRSTE KATASTROFALNIH RIZIKA

### Šta je katastrofalni rizik?

Iz samog naziva katastrofalni rizik vidi se da je riječ o nekoj vrsti katastrofe, odnosno o riziku koji pogađa veliki broj ljudi i nanosi ogromne štete i posljedice. To je jedna od osnovnih karakteristika njenog ispoljavanja, što pogađa veliku geografsku površinu i, istovremeno, veliki broj objekata i ljudi. Zapravo, katastrofalni rizik predstavlja pojedinačnu opasnost koja prijete velikom broju ljudi i velikoj imovini, ugrožavajući ekonomsku snagu osiguravača i društva u cjelini, odnosno njegovog dijela pogođenog ovim rizikom.

### Vrste katastrofalnih rizika

Pod katastrofalnim rizicima podrazumijevaju se, prije svega, prirodne nepogode kao što su: poplava, visoka voda, oluja, uragan, zemljotres, klizanje tla itd., zatim požari, eksplozije ili ratni rizici, atomski rizici ili rizici od terorističkih napada, ali, također, i rizik nuklearnog terorizma ili pandemije bolesti. Pored toga što katastrofalni rizici mogu biti rezultat prirode (prirodnih nepogoda), njih može iza-

shall be proclaimed when it is clear that the available resources and funds are not sufficient to prompt relief. Although there are different types of disasters, they share the potential to cause serious adverse effects that are at the root of every adversity, accidents and disasters.

Disaster Risk can be defined as the risk which represents the danger that threatens a large number of people and great assets, and whose expression endangers not only the economic strength of insurers, but also society as a whole, or its part affected by this risk.

Below we shall speak generally about the catastrophic risks in Bosnia and Herzegovina and in Serbia, their types, consequences, insurance, and special attention will be directed to the floods as a natural disasters.

## TERMS AND TYPES OF CATASTROPHIC RISKS

### What is catastrophic risk?

From the name itself, catastrophic risk, is seen as some kind of disaster, or the risk that affects a large number of people and causes huge amounts of damage and consequences. One of the basic characteristics of its presentation, is that it affects quite a large geographical area and, at the same time, a large number of objects and people. Indeed, catastrophic risk is the individual danger that threatens a large number of people and a large property, endangering the economic strength of insurers and society as a whole, or its part affected by this risk.

### The types of catastrophic risks

Catastrophic risks include, first of all, natural disasters such as floods, high water, storm, hurricane, earthquake, landslides and so on, then the fires, explosions or war risks, nuclear risks or the risks of terrorist attacks, but also the risk of nuclear terrorism or pandemic disease. Catastrophic risks may be the result of nature (natural disasters), but can also be caused by the humans as well. For society as

zvati i čovjek. Za društvo kao cjelinu ispoljavanje katastrofalnog rizika dovodi do poremećaja velikog broja funkcija karakterističnih za svako društvo. Ukoliko se, npr., dogodi neki rizik velikih razmjera, može doći i do socijalnog haosa, pa tako i do ugrožavanja zdravlja velikog broja ljudi, ekonomskog i materijalnog sloma za veliki broj porodica, gubitka života ili oštećenja i gubitka velikog broja stanova i slično. Nadalje, postoji mogućnost da se ugrozi i infrastruktura društvene zajednice, tj. da se unište komunalni objekti, objekti za snabdjevanje toplotnom i električnom energijom, putne i željezničke mreže, kao i PTT saobraćaja.

### Kada se štetni događaj klasifikuje kao katastrofalan i koje su posljedice katastrofalnih rizika?

Svaki događaj koji je nemoguće predvidjeti, ili ako znamo da će se dogoditi a ne možemo predvidjeti kada, je u stvari „štetni događaj“. Štetni događaj postaje katastrofalan u sljedećim slučajevima:

1. ako je izazvao štetu u iznosu od najmanje 96 miliona američkih dolara;
2. ako za posljedicu svog ispoljavanja ima 50 povrijeđenih lica, 20 smrtnih slučajeva, ili gubitak doma za najmanje 2.000 ljudi;
3. ukoliko ima za posljedicu ekonomske gubitke koji prevazilaze 1% bruto domaćeg proizvoda (Kočović, 2014, str. 4).

Kako katastrofalni rizici imaju rastući intenzitet i frekvencije u globalnim razmjerama, oni predstavljaju ključnu prijetnju održivom razvoju u savremenim uslovima. Katastrofalni rizici imaju za posljedicu ogromne materijalne gubitke i ljudske žrtve.

Posljedice katastrofalnih rizika manifestuju se u vidu:

1. humanitarnih efekata koji podrazumijevaju gubitak ljudskih života, povrede;
2. ekonomskih efekata, ispoljenih u oštećenju i uništenju infrastrukture, stambenih i komercijalnih objekata i drugih materijalnih oblika aktive, izgubljenim

a whole, expression of the catastrophic risks leads to disruption of a large number of functions characteristic to any society. If, for example, a risk of large-scale develops, it can lead to the social chaos, and thus to endangering the health of a large number of people, economic and material breakdown for many families, loss of life or damage and loss of a large number of apartments etc. Furthermore, there is a possibility of endangering the infrastructure of the community, i.e. to destroy communal facilities, facilities for the supply of heat and electricity, road and rail networks, as well post service traffic.

### When is an adverse event classified as catastrophic and what are the consequences of catastrophic risk?

Each event that is impossible to predict, or if it is known that it will happen but we can not predict when, is in fact “adverse event”. Adverse event becomes catastrophic in the following cases:

1. if it caused damage amounting to at least 96 million US dollars;
2. if the result of its manifestation has 50 injured persons, 20 deaths, or the loss of a home for at least 2,000 people;
3. if it has resulted in economic losses that exceed 1% of gross domestic product (Kočović, 2014, p. 4).

As catastrophic risks have a growing intensity and frequency in global terms, they represent a critical threat to sustainable development in modern conditions. Catastrophic risks have resulted in huge economic losses and casualties.

The consequences of catastrophic risks are manifested in:

1. humanitarian effects involving loss of human lives, injuries;
2. economic effects, manifested in the damage and destruction of infrastructure, residential and commercial buildings and other tangible forms of assets,

zaradama usljed prekida rada poslovnih subjekata;

3. ekoloških efekata tj. gubitka obradivog zemljišta i degradacije ekosistema.

Ekonomski gubici po osnovu katastrofalnih događaja, od 1970. godine do početka 90-ih godina XX vijeka, povećali su se po prosječnoj stopi od 22,3% što je iznosilo 22 milijarde američkih dolara prosječno godišnje. Za razliku od prosječne stope rasta ekonomskih šteta, prosječna godišnja stopa rasta materijalnih šteta od 90-ih godina XX vijeka do 2013. godine iznosila je 31,2%, a njihov prosječni godišnji iznos dostigao je čak 147 milijarde američkih dolara (Ibidem, str. 7).

### Dva osnovna svjetska modela borbe sa posljedicama katastrofalnih rizika

Kako su posljedice katastrofalnih rizika izuzetno velike, a često i kobne za društvo, u svjetskoj praksi uvedena su dva osnovna modela, sa više varijacija, po kojima se države bore sa posljedicama katastrofalnog rizika.

Kod prvog modela država nema učešće u pokriću šteta nastalih kao posljedica katastrofalnih događaja, već se štete pokrivaju putem ugovornog osiguranja. Ova vrsta modela primjenjuje se u: (1) zemljama koje imaju visoko razvijenu infrastrukturu i tržišnu privredu i (2) zemljama kod kojih nisu zabilježene značajne prirodne katastrofe kao što su zemljotresi, tornada, a sve uz uslov da je industrija osiguranja veoma razvijena.

Primjer za ovaj model je Holandija.

Za razliku od prvog, kod drugog modela, pored postojanja ugovornog osiguranja, i država direktno ili indirektno učestvuje u rješavanju nastalih šteta. Ono što je karakteristično za ovaj model jeste da država nakon ispoljavanja katastrofalnih događaja i utvrđivanja uzroka i obima štete, kao i potraživanja subjekata koji su štetu pretrpjeli, iz budžeta interveniše na otklanjanju posljedica koje su nastale iz ispoljavanja ovih rizika. Varijacija ovog modela podrazumijeva osnivanje posebnih osiguravajućih organizacija u vlasništvu države koje putem direktnog osiguranja ili

loss of earnings due to interruption of business entities;

3. environmental effects, i.e. the loss of cultivable land and degradation of the ecosystems.

The economic losses based on catastrophic events, from 1970 to the beginning of the 90's of XX century, increased at an average rate of 22.3%, which accounted to 22 billion US dollars average per year. Unlike the average growth rates of economic damages, the average annual growth rate of damage from the 90's of XX century to 2013 was 31.2%, and their average annual amount reached even 147 billion US dollars. (Ibidem, p. 7).

### Two basic models in the world in dealing with the consequences of catastrophic risks

Since the consequences of catastrophic risk are very large, and can be fatal for the society, practice introduced two basic models, with more variations, by which the state struggles with the consequences of catastrophic risks.

In the first model the state does not participate in the coverage of damage incurred as a result of catastrophic events, but the damages are covered by contractual insurance. This type of model is applied to: (1) countries with highly developed infrastructure and a market economy and (2) countries without significant natural disasters such as earthquakes, tornadoes, and all under the condition that the insurance industry is highly developed.

An example of this model is The Netherlands.

Unlike the first, in the second model the states directly or indirectly participate in the resolution of claims incurred, despite the existence of contractual insurance. Characteristic of this model is that the state after the manifestation of catastrophic events and determining the cause and extent of damage, and claims of subjects who suffered damage intervenes from its budget to reverse the consequences arising from the manifestation of these risks. A variation on this model involves the establishment of special insurance organizations that are state-owned through direct insurance or rein-

reosiguranja utiču na stvaranje posebnih fondova iz kojih se nadoknađuju štete, kao što je recimo u Francuskoj, SAD i Japanu.

urance, affect the creation of special funds from which they compensate the damage, as for example in France, in the USA and Japan.

## CILJEVI I CIKLUS UPRAVLJANJA KATASTROFAMA

## GOALS AND DISASTER MANAGEMENT CYCLE

Pod ciklusom upravljanja katastrofalnim rizicima podrazumijevaju se sve aktivnosti, mjere i programi koji se preduzimaju prije, u toku i nakon katastrofe kako bi se katastrofa izbjegla, smanjio njen uticaj i oporavljanje od pretrpljene štete. Znači, svaki ciklus upravljanja katastrofama ima sljedeća tri osnovna cilja: (1) smanjiti ili izbjeći potencijalne gubitke od hazarda; (2) obezbijediti brzu i prikladnu pomoć žrtvama katastrofe; (3) postići brz i efikasan oporavak.

Cycle management of catastrophic risks refers to all activities, programs and measures to be taken before, during and after a disaster in order to avoid disaster, reduce its impact and recovery of the damage suffered. So, each cycle of disaster management has the following three main objectives: (1) reduce or avoid potential losses from hazards; (2) provide rapid and appropriate assistance to victims of disasters; (3) achieve a quick and efficient recovery.

Sljedeće tri faze su ključne u upravljanju katastrofalnim rizicima.

The following three phases are crucial in managing catastrophic risks.

### 1. Faza prije katastrofe

Sve aktivnosti koje se preduzimaju u ovoj fazi imaju isti cilj - smanjiti potencijalne i materijalne gubitke u slučaju katastrofe.

### 1. Pre-disaster phase

All activities undertaken at this stage have the same goal - to reduce the potential material losses in the event of a disaster.

### 2. Faza tokom trajanja katastrofe

Ova faza obuhvata sve korake koji se preduzimaju kako bi se na što efikasniji i efektivniji način zbrinule žrtve i smanjile pretrpljene štete.

### 2. Phase during the disaster

This phase includes all the steps that are taken to be the most efficient and effective way to help victims and reduce damage suffered.

### 3. Faza nakon katastrofe

Ovdje se radi o preduzimanju inicijative da se reaguje na udes u cilju brzog oporavka pogođenog stanovništva neposredno nakon što se akcident odigrao. Za ove aktivnosti postoji jedan naziv - mjere brzog reagovanja i oporavka.

### 3. The phase after disaster

It is about taking the initiative to respond to the accident to enable quick recovery of the affected population immediately after the accident occurred. For this activity, there is one name - measure of rapid response and recovery.

### 4. Oporavak (povratak u normalno stanje)

Oporavak podrazumijeva preduzimanje svih aktivnosti i određivanje smjernica za normalizaciju životnog standarda poslije katastrofe, kao npr. izgradnja privremenog smještaja.

### 4. The recovery (return to normal state)

Recovery implies taking all activities and definition of guidelines for the normalization of the standard of living after disasters such as establishment of an interim accommodation.

### 5. Ponovna izgradnja, rekonstrukcija

Ovo je dugoročno reagovanje na efekte katastrofe. U ovoj fazi obnavlja se infrastruktura, ekosistemi i uslovi života uopšte.

### 5. Rebuilding, reconstruction

This is a long-term response to the effects of the disaster. At this stage it is renewed infrastructure, ecosystems and living conditions in general.

## PRIMJERI NAJVEĆIH I NAJSMRTONOSNIJIH PRIRODNIH KATASTROFA U LJUDSKOJ ISTORIJI

Znamo da su prirodne katastrofe posljedice prirodnih opasnosti (npr. vulkanskih erupcija, zemljotresa, klizišta itd.) i da prouzrokuju velike štete, ugrožavaju društvo u cjelini, ostavljajući za sobom vrlo često i veliki broj ljudskih žrtava. U nekim slučajevima prirodne katastrofe su dovele do gubitka miliona života. Navodimo neke od najsmrtonosnijih prirodnih katastrofa u ljudskoj istoriji, po broju žrtava koje su odnijele.

1. Alepski zemljotres (1138, Sirija) - 230.000 mrtvih

Nakon prvog zemljotresa koji je pogodio ovo mjesto, nastupila su sljedeća dva i to: prvi od oktobra 1138. do juna 1139. i drugi, mnogo razorniji od septembra 1156. do maja 1159.

2. Čunami u Indijskom okeanu (2004, Indijski okean) - 230.000 mrtvih

Prije 10 godina (26. decembra 2004. godine) dogodio se čunami prouzrokovan podzemnim zemljotresom ispod Indijskog okeana i tom prilikom odnio je veliki broj ljudskih žrtava. Ovo je drugi najjači zemljotres ikada zabilježen seizmografom, koji je bio toliko jak da je u tom trenutku cijela planeta „zavibrirala” za oko 1 centimetar.

3. Zemljotres Tangsan (1976, Kina) - 242.000 mrtvih

Kada je riječ o gubitku ljudskih života, u modernoj istoriji, tangsanski zemljotres je jedan od najsmrtonosnijih. Ovaj zemljotres pogodio je Tangsan u ranim jutarnjim satima, jačinom 7,8 stepeni po Rihteru i trajao je oko 15 sekundi. To je bio prvi zemljotres u novijoj istoriji koji je direktno pogodio neki tako veliki grad.

Ovo su samo neki od primjera, a postoji još niz sličnih kao što su Indijski ciklon 1839. godine, gdje je stradalo preko 300.000 ljudi ili zemljotres u Šensi (provincija u centralnom dijelu Kine) 1556. godine sa oko 830.000 žrtava.

## EXAMPLES OF THE LARGEST AND THE MOST DEADLY NATURAL DISASTERS IN THE HUMAN HISTORY

It is well known that natural disasters are caused by natural hazards (ex. volcanic eruptions, earthquakes, landslides, etc.) leaving behind a lot of damage. They endanger the whole society, leaving very often a large number of casualties. In some cases, natural disasters have led to loss of millions of lives. Below are listed some of the deadliest natural disasters in the human history, by the number of victims which those claimed.

1. Aleppo earthquake (1138, Syria) - 230,000 dead

After the first earthquake that hit this place, another two followed: the first from October 1138 to June 1139 and the second, much more devastating from September 1156 to May 1159.

2. The tsunami in the Indian Ocean (2004, Indian Ocean) - 230,000 dead

10 years ago (26th of December 2004) there was a tsunami caused by an underground earthquake beneath the Indian Ocean and on this occasion took a large number of casualties. That was the second strongest earthquake ever recorded by seismograph, which was so strong that, at that moment the whole planet “vibrated” for about 1 centimeter.

3. Tangshan Earthquake (1976, China) - 242,000 dead

When it comes to the loss of human life, in modern history, Tangshan earthquake is one of the deadliest. This earthquake struck Tangshan in the early morning hours, the intensity of 7.8 degrees on the Richter scale and lasted about 15 seconds. It was the first earthquake in recent history that has directly affected a big city.

These are just some examples, and there are many similar such as Indian cyclone in 1839, which killed more than 300,000 people or an earthquake in Shaanxi (province in the central part of China) in 1556 with approximately 830,000 victims.

## KATASTROFALNI RIZICI U BOSNI I HERCEGOVINI I SRBIJI

Kao i u svijetu, i u Bosni i Hercegovini i Srbiji katastrofalni rizici obuhvataju:

1. rizike od prirodnih katastrofa (zemljotresi, olujni vjetrovi, poplava, vulkanske erupcije);
2. rizik kritične infrastrukture (transportni sistemi, vodosnabdjevanje, sistemi za električnu energiju, kompleksni sistemi);
3. katastrofalne ekološke rizike (klimatske promjene, genetski inženjering, nuklearne centrale);
4. rizik ljudskog faktora - terorizam.

Za Bosnu i Hercegovinu i Srbiju karakteristično je to što su njihova područja najviše podložna riziku pojave različitih vrsta prirodnih katastrofalnih rizika. Imajući u vidu učestalost katastrofalnih nepogoda, u Bosni i Hercegovini i Srbiji se poplave i klizišta mogu smatrati prioritetnim rizicima. Svjedoci smo nedavnih poplava koje su u novembru i decembru 2010. godine i maju 2014. godine pogodile Srbiju i Bosnu i Hercegovinu i ostavile za sobom velike posljedice i određen broj žrtava. Ovoj aktualnoj temi posvetićemo posebnu pažnju.

Poplava se može definisati kao prirodna nepogoda koja podrazumijeva privremeno, djelimično ili kompletno plavljenje suve površine zemlje usljed: (1) preljevanja rijeka, potoka, kanala, jezera, itd.; (2) obilnih atmosferskih padavina; (3) poplavnog olujnog talasa; (4) cunamija; (5) riječnih ili morskih talasa; (6) potoka blata ili lahar; (7) probijanja objekata koji zaustavljaju vodu (brane i ustavi); (8) nadolaženja podzemnih voda; (9) vraćanja otpadnih voda u kanalizaciju.

### Poplave u Bosni i Hercegovini

Još od ranije je poznato da je područje Bosne i Hercegovine izloženo vrlo visokom riziku od poplava. Posljednje poplave katastrofalnih razmjera koje su pogodile Bosnu i Hercegovinu u maju 2014. godine, kao i one iz 2010. godine, su poplave sa najvećom količinom padavina u poslednjih 120 godina. Poplave su nanijele velike materijalne šte-

## CATASTROPHIC RISKS IN BOSNIA AND HERZEGOVINA AND IN SERBIA

As in the world, in Bosnia and Herzegovina and Serbia as well, catastrophic risks include:

1. risks of natural disasters (earthquakes, windstorms, floods, volcanic eruptions);
2. the risk of critical infrastructure (transport systems, water supply systems, electricity, complex systems);
3. catastrophic environmental risks (climate change, genetic engineering, nuclear power plants);
4. the risk of human factor - terrorism.

For Bosnia and Herzegovina and Serbia, it is characteristic that their areas are most exposed to the risk of different types of natural catastrophic risks. According to frequency of disasters in Bosnia and Herzegovina and Serbia, floods and landslides can be considered as a priority risks. We are witnessing the recent floods that in November and December 2010 and May 2014, struck Serbia and Bosnia and Herzegovina and left behind huge consequences and a certain number of victims. Special consideration will be given to this topic.

Flooding can be defined as a natural disaster, which means the temporary, partial or complete inundation of dry ground surface due to: (1) flooding of rivers, streams, canals, lakes, etc.; (2) abundant atmospheric precipitation; (3) flood stormy waves; (4) tsunami; (5) river or sea waves; (6) streams of mud; (7) objects that stop water (dams and weirs); (8) affluxion of groundwater; (9) drain the wastewater into the sewer.

### Floods in Bosnia and Herzegovina

It is already well known that the area of Bosnia and Herzegovina is exposed to very high risk of flooding. The last catastrophic flood that hit Bosnia and Herzegovina in May 2014, as well as those from 2010, are the floods caused by the highest rainfall in the last 120 years. The floods have caused major damage not only to the economy, but also to infrastructure facili-

te ne samo privredi nego i infrastrukturnim objektima, zdravlju stanovništva, uključujući i gubitke ljudskih života. Ukupni finansijski iznos ekonomskih efekata nepogoda (uništenje ili teško oštećenje imovine, infrastrukture i robe, kao i posljedice razaranja privrednih kapaciteta i proizvodnje) je dostigao 2,04 milijarde evra. Veći dio tog iznosa se odnosi na privatni sektor, domaćinstva, mala, srednja i velika preduzeća, te poljoprivredne proizvođače, uključujući i veliki broj osoba iz ugroženih društvenih kategorija. Za Federaciju Bosne i Hercegovine ukupne posljedice (štete i gubici) su procijenjene na 1,04 milijarde evra, za Republiku Srpsku ta cifra je 968,30 miliona evra, dok je za Brčko distrikt Bosne i Hercegovine ukupan iznos 29,60 miliona evra (European Commission, 2014, str. 4).

Takođe, ne treba zaboraviti ni poplave koje su zadesile Republiku Srpsku i Bosnu i Hercegovinu u novembru i decembru 2010. godine. Procjene su da je samo u Republici Srpskoj šteta od tadašnjih poplava oko 130 miliona KM, a ukupna šteta za cijelu BiH u novembru i decembru 2010. godine dostiže pola milijarde KM (Reuters, 2010). Kao što se može primijetiti, poplave su postale sve učestalije na ovom području, rizik od njih je sve veći, a preduzete mjere za zaštitu i odbranu od poplava su u zaostatku.

Činjenica je da se poplave nisu mogle u potpunosti izbjeći, ali su mogle biti znatno manje da je postojao funkcionalan i efikasan sistem zaštite od poplava. Kada je riječ o sistemu upravljanja vodama u Republici Srpskoj, ingerencije nad upravljanjem vodama su podjeljene između Vlade Republike Srpske, posredstvom Ministarstva poljoprivrede, šumarstva i vodoprivrede, i lokalne zajednice. Već u Federaciji BiH upravljačka struktura je složenija. Odgovornost za upravljanje vodama u FBiH je podjeljeno između Federalnog ministarstva poljoprivrede, vodoprivrede i šumarstva, ali i kantonalnih ministarstva u čijoj nadležnosti je resor voda, uz, takođe, određene odgovornosti i vlasti na lokalnom nivou.

ties, public health, including the loss of human lives. The total amount of financial economic effects of the natural disasters (destruction or serious damage to property, infrastructure and goods, as well as the consequences of the destruction of economic capacities and production) reached 2.04 billion of euros. Most of this amount relates to the private sector, households, small, medium and large enterprises, and agricultural producers, including a large number of people from disadvantaged social categories. For the Federation of Bosnia and Herzegovina total consequences (damage and losses) are estimated at 1.04 billion euros, for the Republic of Srpska, the figure was 968.30 million while the Brcko district of Bosnia and Herzegovina had the total amount of 29.60 million euros (European Commission, 2014, p. 4).

Also, it should not be forgotten of the floods that occurred in the Republic of Srpska and Bosnia and Herzegovina in November and December 2010. Since the flood, estimated damages in Republic of Srpska alone was about 130 million BAM, and the total damage for whole Bosnia and Herzegovina in November and December 2010, reached half a billion BAM (Reuters, 2010). As it can be seen, the floods have become more frequent in this area, so the risk of flooding is growing, and the measures of protection and flood defense are lagging behind.

The floods could not be completely avoided, but there could have been much less of them if there was a functional and effective system of flood protection. When it comes to water management system in the Republic of Srpska, jurisdiction of water management is divided between the Government of the Republic of Srpska, through the Ministry of Agriculture, Forestry and Water Management, and the local community. However in the Federation of Bosnia and Herzegovina governance structure is more complex. Responsibility for water management in Federation of Bosnia and Herzegovina is divided between the Federal Ministry of Agriculture, Water Management and Forestry, as well as cantonal ministries that are in charge of the department of water, and still certain responsibilities and authorities are on the local level.

Krajnje je vrijeme ozbiljno se pozabaviti pitanjem Kako se zaštititi od poplava?

Jedan od sigurnih načina jeste izgradnja efikasnog sistema zaštite od poplava, a, da bi se to postiglo, potrebno je taj sistem postaviti na način koji omogućava planiranje i implementaciju preventivnih mjera usaglašenih na cijelom riječnom slivu sa jasno određenim odgovornostima svakog nivoa odlučivanja. Takođe, u BiH se rizici od poplava mogu smanjiti izgradnjom adekvatnih objekata, a to su nasipi i akumulacije i onda će se rizici od poplava smanjiti. Neophodno je i hitno pokrenuti proces izgradnje nove dugoročne strategije ulaganja za odbranu od poplava, procijeniti buduće potrebe u slučaju poplava i odbrane od poplava, te obezbijediti funkcionalnu i jedinstvenu bazu podataka sa WEB prikazom iz svih krajeva naše države na osnovu koje će se imati uvid u opremljenosti uprava i štabova civilne zaštite (raspolaganje čamcima, motorima, mehanizacijom, spasilačkom opremom, cisternama za vodu, itd).

Prema tome, u Bosni i Hercegovini je neophodno u kontinuitetu dalje razvijati sisteme zaštite i spašavanja od prirodne nesreće kakva je poplava, ulagati u izgradnju i održavanje zaštitnih objekata i sistema, ali i pružiti kontinuiranu obuku pojedincima i organizacijama da djeluju u slučaju vanrednih situacija.

### Poplave u Srbiji

Prema podacima iz Nacionalne strategije zaštite i spašavanja u vanrednim situacijama, u Srbiji se između 1900-1940. godine na svakih deset godina događalo po 100 prirodnih katastrofa. Stopa rasta tih prirodnih katastrofa se nastavila i od 1960. do 1970, kada ih je bilo skoro sedam puta više, a od 1980. do 1990. čak 2000 prirodnih katastrofa je zadesilo Srbiju. Od 1990. do 2000. broj prirodnih katastrofa u Srbiji porastao je na 2800. Ostale su zapamćene katastrofalne poplave u Vojvodini kada se na malu banatsku varoš Jaša Tomić izlilo vode koliko cijeli Beograd potroši za godinu dana, zemljotres koji je samo prije par godina uzdrmao Kraljevo ili ledena zima

It is about time to deal with issue of How to protect against floods?

A safest way is to build an efficient system of flood protection, and to achieve this, it is necessary to set up the system in a way that allows the planning and implementation of preventive measures in the entire river basin, with clearly defined responsibilities of each level of decision-making. Also, the risks of floods in Bosnia and Herzegovina can be reduced by building adequate facilities, such as dams and reservoirs, which would reduce the risks of flooding. It is necessary and urgent to start the process of building a new long-term investment strategy for prevention of floods, assess future demands in case of flooding and flood control and provide a functional and a unique database with web presentation from all parts of our country on the basis of which everyone will have access to equipment management and civil defense (available boats, engines, equipment, rescue equipment, water tanks, etc.).

Therefore, in Bosnia and Herzegovina it is necessary to continuously further develop systems of protection from natural disasters like floods, to invest in the construction and maintenance of flood control facilities and systems, but also to provide continuous training to individuals and organizations to act in case of emergencies.

### Floods in Serbia

According by the National Strategy for protection and rescue in emergency situations, in Serbia between 1900 - 1940 years, 100 natural disasters occurred in a decade alone. The growth rate of these natural disasters increased from 1960 to 1970, when it was almost seven times higher, and from 1980 to 1990 up to 2000 natural disasters hit Serbia. From 1990 to 2000, the number of natural disasters in Serbia has increased to 2800. The other devastating floods happened in Vojvodina, when on the small town in Banat called Jasa Tomic poured out as much water as a whole Belgrade spends in a year, the earthquake that just a few years ago struck Kraljevo or icy winter that

koja je tri nedelje paralisala život i poslovanje privrede (Pavlović, 2012, str. 16).

Međutim, svijest građana o rizicima od prirodnih nepogoda kojima je područje Srbije izloženo, je na vrlo niskom nivou. I dalje se objekti grade u zabranjenim zonama, protivno standardima građevinske struke, zbog čega je šteta veća nego što bi mogla da bude. Pretjerano i neplansko sječanje šuma dovelo je do toga da je 75% teritorije Srbije pokriveno erozivnim tlom, a istovremeno postoji i 11.500 bujičnih vodotokova koji, u slučaju kiše, nose veliku količinu i vode i mulja. Iz Udruženja bujičara i Zavoda za zaštitu od bujica i erozije navode da je ukupan godišnji budžet za vode, uključujući sve nivoe vlasti, od 200 do 220 miliona evra, a potrebe su četiri puta veće. Ove godine izdvojeno je 30 miliona evra za zaštitu voda, od kojih samo 300.000 evra za zaštitu od bujica. Kako je samo 30% Srbije pošumljeno i, samim tim, nema šta da zadržava vodu, već voda sa sobom odnosi zemlju i stvara erozivna područja, treba se usmjeriti na pošumljavanje erodiranih područja, podizanje šumskih zaštitnih pojaseva na padinama, koji će zadržavati vlagu i zemlju. Pokret gorana Srbije mnogo je doprinio na smanjivanju erodivnih terena i njihov rad je vrlo bitno podržati, ali i izgraditi pregrade za sprečavanje dubinske erozije i regulisati bujične tokove. Poplave u Srbiji su imale za posledicu: (1) ukupnu štetu od oko 2 milijarde evra; (2) 25 smrtnih slučajeva; (3) gubitak doma za preko 10.000 ljudi; (4) ekonomske gubitke preko 6,6% bruto domaćeg proizvoda (Kočović, 2014, str. 5).

Jedan od načina zaštite od prirodnih katastrofa jeste osiguranje od njih. Međutim, učešće osiguranja od elementarnih nepogoda u portfelju neživotnog osiguranja je gotovo zanemarljivo, iako bi masovnošću uvođenja obaveznog osiguranja značajno pojeftinio ovaj proizvod. Prema podacima Narodne banke Srbije, tokom 2013. godine zaključeno je samo 18.658 ugovora o osiguranju usjeva i plodova sa ukupnom premijom osiguranja od 1,5 milijardi dinara (što čini svega 2,34% ukupnog tržišta osiguranja). Ovi podaci upu-

paralyzed life and business economy for three weeks (Pavlović, 2012, p. 16).

However, society awareness about the risks of natural disasters in the exposed area in Serbia, is at a very low level. Facilities and buildings are still constructed in prohibited areas, contrary to the standards of the construction profession, which is why the damage is larger than it should be. Excessive and unplanned cutting of forests has led to the fact that 75% of Serbia's territory is covered by soil erosion, while there are 11,500 torrential streams that, in case of rain, carry a large amount of water and mud. Seasonal River Association and the Institute for the Protection of torrents and erosion stated that the total annual budget for water, including all levels of government, is from 200 to 220 million euros, and the needs are four times bigger. This year € 30 million has been allocated for the protection of flood waters, of which only 300,000 euros for the protection of the torrents. Since only 30% of Serbia is forested there is nothing to retain all the water, and due to soil being washed away erosive areas are created. Focusing on afforestation of eroded areas and raising the forest shelter belts on the slopes will help retain the moisture and the soil. Nature Conservation Movement of Serbia contributed to the reduction of erosion of the terrain and their work is very important, but it is also important to build the barriers for preventing deep erosion and regulating torrential flows. Floods in Serbia caused: (1) total loss of about 2 billion euros; (2) 25 deaths, (3) loss of home for over 10,000 people; (4) economic losses of over 6.6% of gross domestic product (Kočović, 2014, p. 5).

One of the ways for protecting from natural disasters is insurance. However, the share of insurance against natural disasters in the portfolio of non-life insurance is almost negligible, although the massiveness of introducing compulsory insurance significantly made this product cheaper. According to the National Bank of Serbia, in 2013 only 18,658 contracts for insurance of crops and fruits with the total insurance premium of 1.5 billion RSD (representing just 2.34% of the total insurance market). This data suggests that the use of funds

ćuju na to da je korišćenje sredstava iz budžeta osnovni način finansiranja šteta i posljedica elementarnih nepogoda u Srbiji.

Međutim, postavlja se pitanje da li je država pri visokom budžetskom deficitu u mogućnosti da sanira ove ogromne štete? Veoma je bitno, zapravo neophodno, upravljati rizicima pre njihove realizacije, odnosno preduzimati preventivne mjere. Kao što je prethodno rečeno, jedna od najbitnijih preventivnih mjera jeste osiguranje od katastrofalnih rizika, koje je zapravo nacionalni interes, s obzirom da oni narušavaju održivi razvoj.

Poslije posljednjih poplava sa ogromnim materijalnim štetama, nadamo se da raste svijest države i građana o neophodnosti osiguranja, i da će se čelnici države ozbiljno pozabaviti pitanjem uvođenja obaveznog osiguranja od katastrofalnih rizika, između ostalog, ali i svim drugim preventivnim mjerama kako bi se izbjegle, moguće, iste ili veće katastrofe.

## ZAKLJUČAK

Katastrofalni rizik možemo definisati kao rizik koji predstavlja pojedinačnu opasnost koja prijeti velikom broju ljudi i velikoj imovini, a čije ispoljavanje ugrožava ne samo ekonomsku snagu osiguravača nego i društva u cjelini, odnosno njegov dio pogođen ovim rizikom. Do nastanka neke katastrofe može da dođe usljed dejstva prirodnih sila kada čovjek nema nikakvog uticaja na ono što se u prirodi dešava, ali, takođe, do nastanka katastrofe može da dođe i usljed dejstva samog čovjeka. Bez obzira na koji je način nastala katastrofa, ono što je krajnji efekat njenog nastanka jesu veliki gubici koje pojedinci sami ne mogu da pokriju, pa čak i veliki smrtni gubici, što se vidjelo u primjerima najvećih katastrofa kroz ljudsku istoriju. Da bi se izbjegli katastrofalni rizici, preduzimaju se brojne aktivnosti, u toku i nakon katastrofe kako bi se katastrofa izbjegla, smanjio njen uticaj i kako bi se države oporavile od pretrpljene štete. Znači, sve te mjere i aktivnosti preduzimaju se u cilju smanjenja potencijalnih gubitaka od hazarda, obezbjeđenja pomoći žrtvama katastrofe i brzog i efikasnog oporavka.

from the budget is the main method of financing of the damage caused by natural disasters in Serbia.

However, the issue is whether the state with already high budget deficit will be able to repair the immense damage? It is indeed essential, to manage the risks before their execution, or take preventive measures. As previously mentioned, one of the most important preventive measures is insurance against catastrophic risk, which is a national interest, since they can distort sustainable development.

After the recent floods with huge material damage, hopefully the state and citizens will increase awareness for the necessity of insurance, and the leaders of the state shall seriously address the issue of introducing compulsory insurance against catastrophic risks, among others, as well as all other preventive measures to avoid possible same or bigger disasters.

## CONCLUSION

Catastrophic risk can be defined as a risk posed by individual risks which threaten a large number of people and great assets, and whose expression endangers not only the economic strength of insurers, but also society as a whole, or part thereof affected by this risk. The occurrence of a disaster may occur due to the effect of natural forces when a man has no impact on what happens in nature, but also the formation of disaster may also occur as a result of the human acts. No matter how is a disaster created, the ultimate effect of its occurrence is big loss that individuals alone can not cover, even large mortal losses, which could be seen in the examples of most devastating disasters in human history. In order to avoid catastrophic risks numerous steps should be taken, during and after a disaster in order to avoid damages, reduce its impact and for the country to recover from the damage suffered. So, all these measures and activities are undertaken in order to reduce potential losses from hazards, providing assistance to victims of disaster and for fast and efficient recovery.

Srbija i Bosna i Hercegovina su područja izložena opasnostima od prirodnih katastrofa, kao što su: poplave, klizišta, olujni vjetrovi, zemljotresi i slično. Posljednje poplave koje su zadesile ova područja, ostavile su iza sebe veliku štetu, ekonomski i materijalni slom brojnih porodica, a, nažalost, i smrtne gubitke. Zbog toga, krajnje je vreme pozabaviti se ovim problemom koji se, očigledno, sve češće i ozbiljnije ponavlja.

Potrebno je izgraditi efikasan i funkcionalan sistem zaštite od poplava kako bi se izbjegle velike katastrofe, smanjili gubici i ubrzao oporavak nakon katastrofe. Jedan od načina zaštite od poplava jeste izgradnja novih i jačanje postojećih nasipa i akumulacija. Takođe, formiranje fondova solidarnosti za obnovu dobra je mjera za sanaciju poplava i brz oporavak ljudi pogođenih ovom prirodnom nepogodom. Hitno je potrebno pokrenuti i proces izgradnje nove dugoročne strategije ulaganja za odbranu od poplava, procijeniti buduće potrebe u slučaju poplava i odbrane od poplava, te obezbijediti funkcionalnu i jedinstvenu bazu podataka sa WEB prikazom iz svih krajeva naše države na osnovu koje će se imati uvid u opremljenosti uprava i štabova civilne zaštite (raspolaganje čamcima, motorima, mehanizacijom, spasilačkom opremom, cisternama za vodu, itd). Jedna od mjera zaštite od poplava jeste i ulaganje u izgradnju i održavanje zaštitnih objekata i sistema, kao i obuka pojedinaca i organizacija da djeluju u slučaju vanrednih situacija. Neophodno je obratiti pažnju i na protiverozivnu zaštitu i spriječiti nekontrolisanu sječú šuma, odnosno uložiti u pošumljavanje erodiranih područja, podići šumske zaštitne pojaseve na padinama, koji će zadržavati vlagu i zemlju u slučaju obilnih padavina. Od velike važnosti za zaštitu od poplava jeste i učešće osiguranja od elementarnih nepogoda koje je u portfelju ne-životnog osiguranja trenutno zanemareno, a moglo bi biti jedno od najsigurnijih načina zaštite od poplava i drugih prirodnih nepogoda.

Serbia and Bosnia and Herzegovina are the areas exposed to the dangers of natural disasters, such as floods, landslides, windstorms, earthquakes and so on. The latest floods which occurred in this area, left behind a lot of damage, economic and substantial breakdown of many families and, unfortunately, death and loss. Therefore it is a crucial time to address this problem, which, obviously has become more frequent and more serious.

It is necessary to build an efficient and functional system of flood protection in order to avoid major disasters, reduce losses and to speed up recovery after a disaster. One way of flood protection is to build new and strengthen existing dikes and reservoirs. Also, the formation of a solidarity fund for reconstruction is a good measure for flood rehabilitation and rapid recovery of people affected by this natural disaster. There is an urgent need to start the process of creating a new long-term investment strategy for floods, to assess future needs in the event of floods and flood control and provide a functional and a single database with web presentation from all parts of our country on the basis of which will have a look at equipment management and civil defense (available boats, engines, and machinery, rescue equipment, water tanks, etc.). One of the measures of flood protection is also investing in the construction and maintenance of flood control facilities and systems, as well as the training of individuals and organizations to act in case of emergencies. It is necessary to pay attention to the anti-erosion protection and to prevent uncontrolled deforestation, or invest in afforestation of eroded areas, raise the forest shelterbelts on the slopes, which will retain moisture and land in case of heavy rainfall. Significant importance has flood insurance and of other natural disasters, which share is currently disregarded in the portfolio of non-life insurance, and it could be one of the safest ways to protect against floods and other natural disasters.

## LITERATURA

- European Commission. (2014). *Procjena potreba za oporavkom i obnovom u Bosni i Hercegovini*. Preuzeto 20. novembra 2014. sa sajta [http://ec.europa.eu/enlargement/pdf/press\\_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf](http://ec.europa.eu/enlargement/pdf/press_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf).
- Fusek, G. (2005). Upravljanje rizikom u osiguranju. *Svijet osiguranja*, br. 4/2005, str. 218.
- Kočović, J. (2014). *Upravljanje rizicima na tržištu osiguranja Srbije*. Preuzeto 15. novembra 2014. sa sajta <http://aktuar.rs/XII/1.ppt>.
- Kočović, J., Šulejić, P. i Rakonjac Antić, T. (2010). *Osiguranje*. Beograd: Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu.
- Milanov, M. (2011). *Analiza primenljivosti ciklusa katastrofalnih događaja u Srbiji na primeru poplava*. Preuzeto 15. novembra 2014. sa sajta <http://www.meteoplaneta.rs/wp-content/uploads/2012/04/ANALIZA-PRIMENLJIVOSTI-CIKLUSA-KATASTROFALNIH-DOGADJAJA-U-SRBIJI-NA-PRIMERU-POPLAVA.pdf>.
- Pajčin, M. (2013). *Uticaj katastrofalnih rizika na poslovanje osiguravajućih kompanija*. Preuzeto 12. novembra 2014. sa sajta <http://www.singipedia.singidunum.ac.rs/attachment.php?attachmentid=3157&d=1368001390>.
- Pavlović, I. (2012). Osiguranje od elementarnih nepogoda. *Svet osiguranja*, br. 3/2012, str. 16.
- Reuters. (2010). *Balkan floods kill three, cause major damage*. Preuzeto 20. novembra 2014. sa sajta <http://www.reuters.com/article/2010/12/06/balkans-floods-idUSLDE6B51U120101206>.
- Thywissen, K. (2006). *Components of Risk: A Comparative Glossary*. Bonn: United Nations University Institute for Environment and Human Security.

## LITERATURE

- European Commission. (2014). *Assessment of the need for rehabilitation and reconstruction of Bosnia and Herzegovina*. Retrived November 15, 2014. from [http://ec.europa.eu/enlargement/pdf/press\\_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf](http://ec.europa.eu/enlargement/pdf/press_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf)
- Fusek, G. (2005). Risk management in insurance. *Svijet osiguranja*, 4/2005, p. 218.
- Kočović, J. (2014). *Risk management in the insurance market of Serbia*. Retrived November 15, 2014. from <http://aktuar.rs/XII/1.ppt>.
- Kočović, J., Šulejić, P. i Rakonjac Antić, T. (2010). *Insurance*. Beograd: Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu.
- Milanov, M. (2011). *The analysis of the applicability cycles of catastrophic events in Serbia in the case of floods*. Retrived November 15, 2014. from <http://www.meteoplaneta.rs/wp-content/uploads/2012/04/ANALIZA-PRIMENLJIVOSTI-CIKLUSA-KATASTROFALNIH-DOGADJAJA-U-SRBIJI-NA-PRIMERU-POPLAVA.pdf>.
- Pajčin, M. (2013). *The impact of catastrophic risks to the business of insurance companies*. Retrived November 12, 2014. from <http://www.singipedia.singidunum.ac.rs/attachment.php?attachmentid=3157&d=1368001390>.
- Pavlović, I. (2012). Insurance against natural disasters. *Svet osiguranja*, br. 3/2012, str. 16.
- Reuters. (2010). *Balkan floods kill three, cause major damage*. Retrived November 20, 2014. from <http://www.reuters.com/article/2010/12/06/balkans-floods-idUSLDE6B51U120101206>.
- Thywissen, K. (2006). *Components of Risk: A Comparative Glossary*. Bonn: United Nations University Institute for Environment and Human Security.

Trako, E. (2014). *Za poplave u BiH krivi su svi nivoi izvršne vlasti*. Preuzeto 10. novembra 2014. sa sajta <http://www.avaz.ba/clanak/138401/za-poplave-u-bih-krivi-su-svi-nivoi-izvrsne-vlasti>.

Vujović, R. (2009). *Upravljanje rizicima i osiguranje*. Beograd: Čugura print.

Trako, E. (2014). *All levels of executive authority are blamed for the floods in Bosnia and Herzegovina*. Preuzeto 10. novembra 2014. sa sajta <http://www.avaz.ba/clanak/138401/za-poplave-u-bih-krivi-su-svi-nivoi-izvrsne-vlasti>.

Vujović, R. (2009). *Risk Management and Insurance*. Beograd: Čugura print.