Information for Western Balkan countries

Project title: Development of master curricula for natural disasters risk management in Western Balkan countries

Acronym: NatRisk

Project number:
573806-EPP-1-2016-1-RS-EPPKA2-CBHE-JP

Lead Organisation of work package 1: BOKU

Participating Organisation:
UNI, MU, KPA, UPKM, UNSA, VSUP, TCASU, UNIME, OE, UNID, RGU, TUC

Work package	Title
1	Analysis of natural disasters needed to be managed in Western Balkan region
Activity	Title
1.1	Report on natural disasters in WB

"This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein"

Identification of natural disasters in the Republic of Srpska

This report has been prepared for the Republic of Srpska[1]. The territory of Republika Srpska is situated between 42° 33' 18"N and 45° 16' 36"N, and 16° 12' 18"E and 19° 37' 44"E, respectively, that is, it covers northern and eastern parts of the geographical area of Bosnia and Herzegovina. The surface area of Republika Srpska, excluding Brčko District, is 24 641 km2. The surface area of Brčko District of BH, which, pursuant to the paragraph 11 of the Final Arbitrary Decision on Brčko District of BiH, is a condominium, that is, a shared territory of Republika Srpska and Federation of BiH, is 493 km2. Population is 1.170.342 inhabitants[2]. Republika Srpska belongs to the group of continental areas – it has no access to the sea. Republika Srpska is located at the meeting point of two large natural geographic and socio-economic regional units – Pannonian and Mediterranean. It is a link between the Pannonian Basin and Adriatic Basin. The geomorphology of the territory of Republika Srpska abounds in different forms. In the northern, Peri-Pannonian part, the hilly terrain composed of Cenozoic deposits gradually descends to the flat land with alluvial plateaus and fluvial terraces, which is also the most fertile area in Republika Srpska. There are only a few scattered mountains in this area – Kozara, Prosara, Motajica, Vučijak, Ozren and Trebovac, as well as the furthermost northeastern slopes of Majevica. Towards the south, the flat land gradually turns first into the hilly terrain and then into the mountainous region which covers the largest portion of the territory of Republika Srpska. The highest mountain peak in Republika Srpska is Maglić, located at 2,386 metres above sea level, on the mountain also named Maglić[3].

An emergency situation is a situation where the risks and threats or the consequences of disasters, emergencies and other dangers for the population, the environment and property of such a scope and intensity that their occurrence or effects can not be prevented or eliminated by regular actions of competent departments and services, therefore, in order to alleviate and eliminate the consequences of such situations, it is necessary to use special measures, forces and resources with increased activities. An emergency situation is declared immediately after learning of the imminent danger of the emergency situation. An emergency situation can be declared after the occurrence, if it was not possible to predict immediate danger or if, due to other circumstances, it could not be declared immediately after learning of the imminent danger of the emergency situation. The decision on the declaration of an emergency, at the proposal of competent staff for emergency situations, is brought by the mayor of the municipality or the mayor for the city area.[4]

Natural disaster is an incidence of hydrological, geological or biological origin, caused by the action of natural forces, such as earthquakes, floods, flash floods, storms, heavy rain, atmospheric discharge, hail, drought, landslide or landslides, snowdrifts and avalanches, extreme air temperatures, freezing water flows, epidemics of infectious diseases and the emergence of pests and other natural phenomena on a larger scale, which can threaten the

[1] Republika Srpska was proclaimed on January 9th, 1992, and verified as a state entity of Bosnia and Herzegovina on December 14th, 1995 by the Dayton Peace Agreement and peace ratification in Paris. Today, Republika Srpska is a parliamentary republic with limited international subjectivity. The largest city in Republika Srpska is Banja Luka, which is an administrative, economic and cultural centre of Republika Srpska. In: Republika Srpska Institute of Statistics. (2016). *Statistical Yearbook of Republika Srpska*. Banja Luka: Republika Srpska Institute of Statistics.

[2] Republičkizavod za statistiku Republike Srpske. (2017). Popisstanovništva, domaćinstava i stanova u RepubliciSrpskoj 2013. godine, Banja Luka: Republičkizavod za statistiku Republike Srpske.

[3] Republika Srpska Institute of Statistics. (2016). *Statistical Yearbook of Republika Srpska*. Banja Luka: Republika Srpska Institute of Statistics.

[4] Zakon o zaštiti i spasavanju u vanrednimsituacijama, Službeniglasnik Republike Srpske, 121/12.

health and life of people or cause severe damage.[5] Data on earthquakes, air temperature, precipitation and rivers' water level and air quality are obtained from the Republic Hydrometeorological Service[6] which performs observation, measuring and collection of these data through the network of stations.

Floods

Annually, the quantity of the rain in Bosnia and Herzegovina is about 1 250 l/m^{2}of rain or a total of 64 x 106 m^3 of precipitation. On the territory of Bosnia and Herzegovina, annual swell is 1,155 m^3/sec or about 57% of total precipitation and 62.3% goes through the Sava River basin to the Black Sea and 37.5% trough river basin to the Adriatic Sea. In general, according to total annual precipitation and runoff, Bosnia and Herzegovina is considered to be water rich area, and climatic, geographical and other relevant factors are adversely affecting the hydrological regime in all relations and on most watercourses, classifying it extremely uneven, not only in space but also in time.[7]

"In BiH, the key challenges are rehabilitation of water supply and water systems, flood control, water quality management and ecosystems, and the development of solid institutional framework".[8]

It is already known that Bosnia and Herzegovina is exposed to a high risk of flooding. Flooding have, on several occasions, inflicted great damage to the economy, infrastructure facilities, the environment, the health of the population, including the loss of human lives, and the last occurred on May 2014, and were catastrophic. Flood damage could not be avoided, but it could have been reduced if all the steps were taken to build a functional and efficient system of flood protection.

Floods in May 2014 in the Republic of Srpska (as well as in other parts of the region in which the floods have occurred) have shown the devastating effects of natural disasters, but also the efficiency of the subjects of protection and rescue system, including the activities of the Police of the Republic of Srpska. In mid-May 2014, the territory of Bosnia and Herzegovina, Serbia and Croatia were caught by a storm accompanied by large amounts of rain, which caused an increase in water levels in all rivers and their tributaries, and flooding vast areas of land.

Such a situation has caused the flooding of a large number of residential, commercial, infrastructure and other facilities, and agricultural and other land, which caused considerable material damage. In the Republic of Srpska, the cities that were particularly affected are: Doboj, Bijeljina, Banja Luka and Prijedor, and a number of municipalities, including Šamac, Vukosavlje, Modriča, Brod, Šekovici, Kozarska Dubica, Janjaetc.[9]

After several days of rainfall in mid-May 2014that has overcome the record of the last 120 years,[10] there was a rapid increase in the river levels of Bosna, Sava and Drina rivers and their tributaries[11].

[5]Zakon o zaštiti i spasavanju u vanrednim situacijama, Službeni glasnik Republike Srpske, 121/12..

[6] Available using the Internet site Republic Hydrometeorological Service: http://rhmzrs.com/

[7]Deronja Suljić,. L., Bulić, M., Telić, D., Ćilimković, A. (2015). *Poplave u BIH – Elementarne nepogode i/ili institucionalna neefikasnost*, Tuzla: Centri civilnih inicijativa.

[8]World Bank. (2003). *Water Resources Management in South Eastern Europe, Volume II, Country Water Notes and Water Facts Sheets*, Washington: The World Bank..

[9] Šikman, M., Amidžić, G. (2014). Nadležnost i uloga policije u vanrednim situacijama u Republici Srpskoj, *Bezbednost*, 3, 129-147

[10] In the last fifteen years, increased rainfall in the area of BiH have occurred in the year 2001 (50 and 100 liters of water per 1 m^2), then in 2003 and 2004, and in 2009 and 2010, while 2011 was a year with an extremely small amount of precipitation.

Considering this, the Agency for the Sava River Basin, in its reports, among other things, stated that these heavy rains led to excess soil water and a significant increase in water levels in all waterways in the Republic of Srpska. Such a complex hydrological situation was followed by precipitation that was unrecorded in the period of 120 years of monitoring rainfall in Bosnia and Herzegovina, which had the following consequence: during the time period from 14 to 16.05. 2014, the precipitation amount was 200–250l/m^2.[12] Such precipitation (of short duration and high intensity) caused enormous increase in water levels in all watercourses in the catchment area of the river Sava. It is estimated that in the middle and lower parts of rivers Bosnia and Spreča catastrophic discharges rank appeared once in 500 years, and on the part of the river basin Sava rank once in 1 000 years.[13]

The Government of the Republic of Srpska has declared an emergency on the entire territory of the Republic of Srpska on May17th. The Council of Ministers of Bosnia and Herzegovina has not declared a state of emergency, on the grounds that there was no request from the institutions!

By the decision of the Government of the Republic of Srpska from May 20th, the local structures of headquarters of civil defense in Doboj and Šamac were replaced, and retired generals were appointed as the leaders of headquarters for emergency situations, taking over the management of cities.

At least 23 people died as a result of floods and thousands were temporarily or permanently evacuated from their homes.

Also, in the flooded areas and areas affected by landslides 14,415 residential buildings were damaged, while 1,030 residential buildings were demolished. In addition, the total flooded surface was 30,478 ha of agricultural land.

According to reports of the competent authorities, in these cantons and municipalities the number of patients with infectious diseases has not increased, and there were not deviations from regular morbidity statistics.

A complex procedure for assessment of damage resulting from natural disasters was launched, and the procedure involved local institutions of different levels of governance and experts from the EU, UN and World Bank.

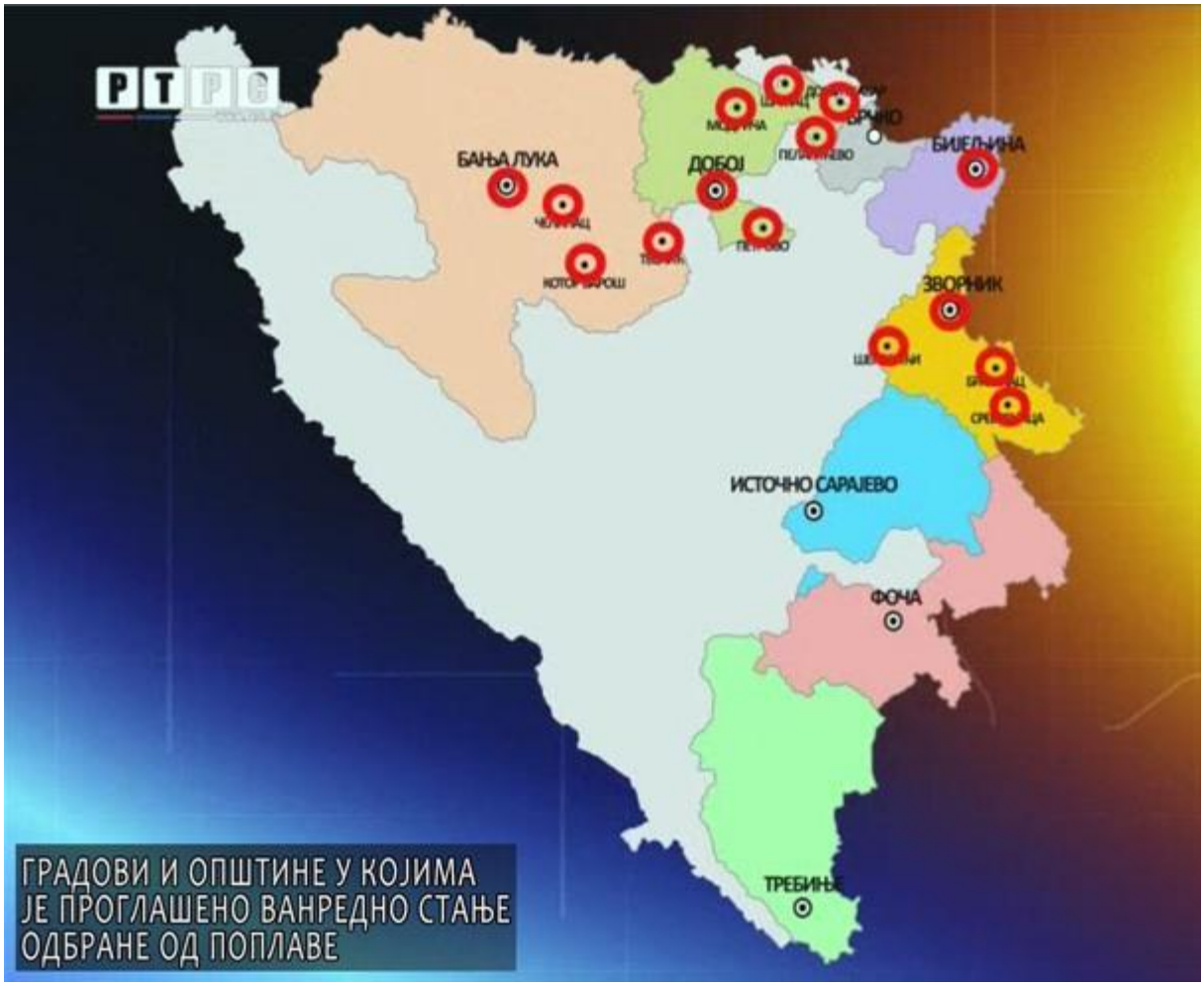
The final estimate of 3.98 billion BAM was done only with the help of international experts, because the entity teams (due to the different methodology used)have expressed doubts about the entity estimates the damage, disputing them.[14]

[11] Data on water level were taken over from the Republic Hydrometeorological Service which measures and collects these data, and they are provided on the basis of daily observations, expressed in centimetres (cm).

[12] It is estimated that the amount of precipitation in the period from 14th to 19th May 2014 was the largest since 1894. Precipitation in these regions have sometimes been up to three times higher than average, and in some places, this was the month May with the highest rainfall since measurements are made (Synoptic analysis for May 2014, 2014).

[13] Deronja Suljić,. L., Bulić, M., Telić, D., Ćilimković, A. (2015). *Poplave u BIH – Elementarne nepogode i/ili institucionalna neefikasnost*, Tuzla: Centri civilnih inicijativa.

[14] Evropska komisija. (2014). Procjena potreba za oporavkom i obnovom u Bosni i Hercegovini. Brisel: Evropska komisija. Dostupno putem internet stranice http://ec.europa.eu/enlargement/pdf/press_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf pristupljeno 15.01.2015.



Cities and municipalities in which the state of emergency declared flood defense

Landslides

Due to the floods, especially during the "floods in May", numerous landslides were activated and residential buildings were demolished. According to available data, in floods that occurred in May in Bosnia and Herzegovina, there was a total of 5,841 triggered landslides in affected areas of municipalities.

Blizzards and snow drifts

Although the area of the Republic of Srpska haven't had long-term problems with blizzards and snow drifts in recent years, still certain problems appear in some parts of the Republic of Srpska and in particular periods in winter which are related to snow drifts on the roads that prevent the normal flow of traffic and economic activities of people that live in that area. This is typical for the area of Foča, especially for travel route trough Čemerno that connects the area of eastern Herzegovina with the area of Sarajevo-Romanija. In addition to this, occasional snow drifts that cause certain problems with the normal functioning of people were recorded in the area of Mrkonjić Grad, Birač and Pale.

Drought

The north and the northwest areas of the Republic of Srpska are focused of agricultural and food production and the fact is that drought is destroying crop industry almost every year. The droughts have been registered almost every year in Republic of Srpska, which represents good base to say that they represent natural disasters that takes place locally, every year, and especially affected areas are municipalities: Bijeljina, Gradiška, Srbac, Šamac, Prijedor, Kozarska Dubica, Laktaši, Banja Luka, Prnjavor etc. The damage caused by drought during the summer

months ranges from 30 to even 70% lower yields than expected (for some agricultural crops), and there were also cases where the damage to crops was in total of 100%.

Epidemics of infectious diseases

Infectious disease is a disease caused by a specific causal factor that occurs as a result of the transfer of the factor or its toxic products from an infected person or another reservoir at a sensitive host, either directly from person to person or indirectly, through contaminated food, water, items of general use, intermediate hosts, vectors or the inanimate environment, and by the exchange of fluid that is contaminated with the infection.[15]

In the past, in Republic of Srpska there was not massive occurrence of infectious diseases of regional character. Also, regardless of the "May floods" in 2014, there weren't any infectious diseases that were found to be the result of specific problems caused by these floods.

However, despite the absence of infectious diseases which would affect the whole region or even the entire Republic of Srpska, the fact is that the relevant authorities have, in the past, declared the potential risk of certain infectious diseases at the local level.

Large scale fires

Large scale fires in Republic of Srpska occur during the spring and summer months and are usually consequence of neglect of agricultural and forestry workers during the agricultural work or preparation of work activities that are used to destroy the weeds from the soil. In addition, on several occasions the large scale fires were recorded in eastern Herzegovina which is characterized by ragged terrain and vegetation that is typical for this region, which resulted in fire that spreads to a larger area, but with no major material damage.

Earthquakes

Data on earthquakes were taken over from the Republic Hydrometeorological Service which carries out observation, measuring and collection of these data through the network of seismological stations[16].

Seismic area of Banja Luka covers a scope of approximately 10 000 km^2 territory; or, in other words – a territory at a distance of 50 km from Banja Luka; and (considering the different return periods) it falls within the area of VII, VIII and IX degrees of maximum expected intensity at MCS scale. Basic characteristics of the seismicity of the area are defined on the basis of data on earthquakes that occurred in the Banja Luka area, as well as from hotspots that surround this region and realize significant seismic effects on it. Historically, this area is characterized, according to available data, by the following earthquakes:

[15] Zakon o zaštiti stanovništva od zaraznih bolesti, Službeni glasnik Republike Srpske, 14/10.

[16] In 2015, the seismological stations network comprised nine digital automatic seismological stations on the territory of Republika Srpska (Banja Luka, Bijeljina, Doboj, Mrakovica, Prijedor, Mrkonjić Grad, Han Pijesak, Trebinje and Rudo), three of which are broadband stations (Banja Luka, Han Pijesak and Mrakovica), while others are short-period. Seismological stations are placed on locations which comply with the required territorial arrangement for locating earthquakes. Sensors at all stations are three-component ones, which means that the earthquake registration is performed in the vertical and two horizontal directions north-south and east-west. Data collection and processing are done in Banja Luka and all stations provided data transmission in real time. In addition to broadband sensors on seismological station Banja Luka, since 2009, has installed an accelerometer that is used to register the strongest earthquakes. In: Republika Srpska Institute of Statistics. (2016). *Statistical Yearbook of Republika Srpska*. Banja Luka: Republika Srpska Institute of Statistics.

- The first series of earthquakes occurred in 1888, and the representative of the series was an earthquake that occurred 20th May 1888, M=5.7 Richter scale and intensity VI degree MCS (Mercalli-Cancani-Sieberg) scale.
- The second series took place in 1935, and the strongest of 7 earthquakes that have occurred in this series was an earthquake of 11th October 1935, P = 5.1 Richter scale and intensity VI Print-degree scale.
- On 26 and 27 October 1969, 4 strong earthquakesoccurred, and the main shock was preceded by two strong earthquakes:
- 26th October 1969 at 3.36 pm; earthquake M=5.6 Richter
- 27th October 1969 at 2.55 am; earthquake M=4.8 Richter

The main strike occurred on 27.10.1969 at 8.10 am, with a magnitude of M=6.6 Richter scale, followed by a sudden surge in the subsequent at 8.53 am, M=4.7 Richter scale. Earthquakes have left disastrous consequences in the area of 15 municipalities of Bosanska Krajina: Banja Luka, Čelinac, Laktaši, Gradiška, Prnjavor, Kotor Varoš, Kneževo, Srbac, Ključ, Jajce, Prijedor, Sanski Most, KozarskaDubica and Novi Grad.

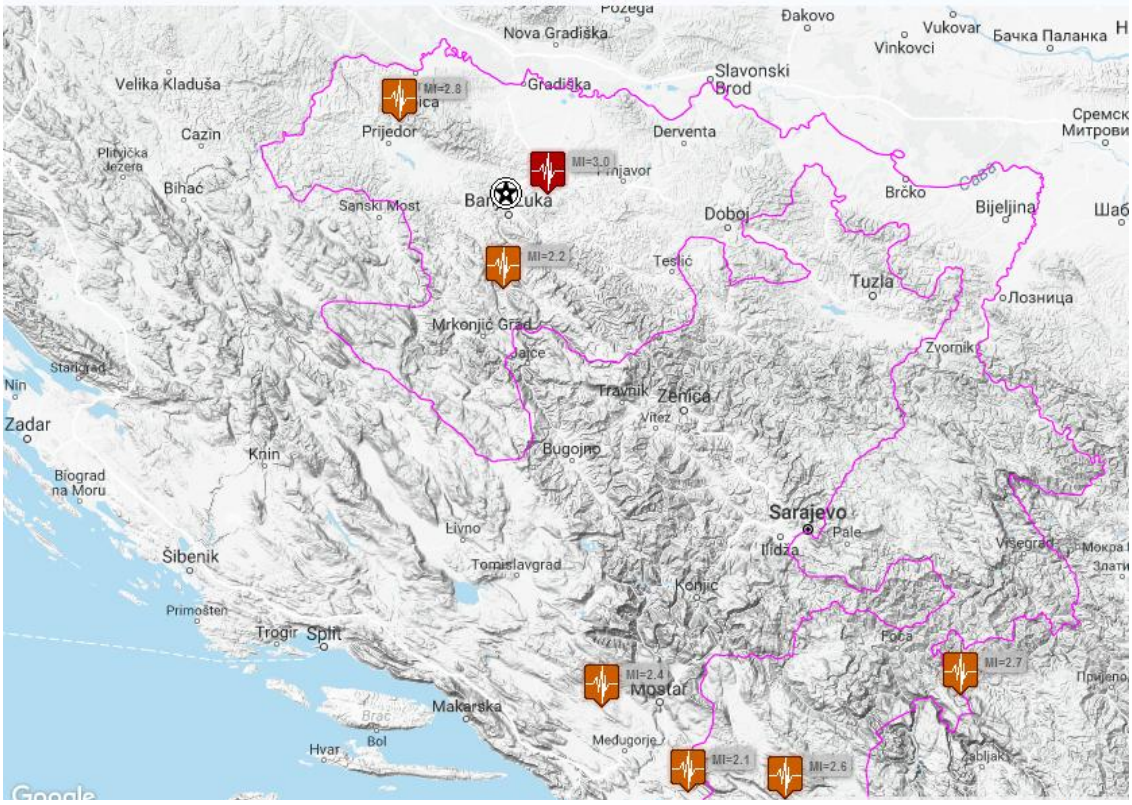
After this series of earthquakes that occurred during 1969, there was another strong aftershocks on December 31.1969, at 2.18 pm, M=5.3 Richter scale. Significant earthquakes after the year 1969 are:

- 20th October 1970 at 2.45 pm with M=4.5 Richter
- 20th October 1970 at 9.19 pm with M=4.6 Richter
- 17th February 1975 at 3.24 pm with M=4.0 Richter
- 21st April 1975 at 1.31 pm with M=4.7 Richter
- 21st April 1977 at 1.31 am with M=4.7 Richter
- 13th August 1981 at 3.58 am with M=5.4 Richter

After 30 years of "quiet time", strong earthquakes that have occurred in the area of Banja Luka region are:

- 29th April 2011 at 1.30 am, the magnitude of M=4.3 Richter
- 28th January 2014 at 1.38 am, the magnitude of M=4.2 Richter[17]

[17]Republički hidrometeorološki zavod. (2017) *Seizmologija*. Dostupno putem interneta: http://rhmzrs.com/seizmologija/, pristupljeno 16.02.2017.



Stronger earthquakes, 1996–2015, with epicenters on the territory of Republika Srpska[18]:

Place (location)	Year	Hypocentral time[19]	Latitude	Longitude	Magnitude[20]	Intensity[21]
Bočac	1996.	14:12:13	44,50	17,23	4,7	6-7
Banja Luka	1996.	11:32:30	44,90	17,40	3,8	5
Banja Luka	1998.	4:26:50	44,79	17,55	3,8	5
Teslić	1998.	12:09:20	44,72	17,71	4,1	5-6
Nevesinje	1998.	23:07:29	43,11	18,24	3,5	4-5
IstočniDrvar	1998.	23:30:47	44,37	16,63	4,1	5-6
Nevesinje	1998.	10:55:13	43,48	18,15	3,9	5
Nevesinje	1998.	13:28:44	43,42	18,12	3,4	4-5
Gacko	1999.	22:20:12	43,04	18,56	3,9	5
Nevesinje	2001.	19:12:21	43,30	18,12	3,8	5
Maslovare	2001.	23:35:26	44,68	17,55	3,0	4
Trebinje	2001.	20:08:16	42,79	18,18	4,6	6-7
Banja Luka	2001.	16:51:16	45,01	17,23	3,7	5
Ljubinje	2001.	2:09:28	42,83	18,10	3,3	4-5
Kotor Varoš	2002.	16:04:01	44,60	17,39	4,0	5-6
Gacko	2002.	19:41:28	43,20	18,47	3,9	5
Foča	2003.	20:15:02	43,31	19,01	3,6	5
Gacko	2003.	11:11:24	43,10	18,51	3,6	5

[18] Republika Srpska Institute of Statistics. (2016). *Statistical Yearbook of Republika Srpska*. Banja Luka: Republika Srpska Institute of Statistics.
[19] Time of the earthquakes is presented in UTC (Universal Time Code)
[20] Magnitude is given in Richter's scale
[21] Earthquake intensity at the epicentre is rated by MCS (Mercalli-Cancani-Sieberg) scale.

Šipovo	2003.	19:17:48	44,28	17,03	3,9	5
Gacko	2003.	8:36:06	43,23	18,51	3,5	4-5
Milići	2003.	10:09:29	44,08	19,09	5,1	6-7
Sarajevo	2004.	15:23:23	43,92	18,50	3,2	4-5
Nevesinje	2004.	4:46:09	43,18	18,13	4,2	5-6
Nevesinje	2005.	0:32:44	43,13	18,15	3,0	4
Jahorina	2005.	11:51:48	43,38	18,83	3,4	4-5
Čemerno	2005.	13:42:47	43,26	18,56	3,5	4-5
Berkovići	2005.	0:25:34	43,22	18,15	5,1	6-7
Kotor Varoš	2006.	11:28:50	44,59	17,48	3,6	5
Foča	2006.	21:33:40	43,37	18,69	3,6	5
Foča	2006.	23:13:12	43,40	18,65	3,9	5
Nevesinje	2006.	17:07:49	43,41	18,03	3,8	5
Nevesinje	2006.	20:01:10	43,39	18,09	4,3	6
Nevesinje	2006.	20:09:26	43,36	18,15	4,2	5-6
Srebrenica	2006.	2:35:24	44,07	19,27	3,6	5
Han Pijesak	2007.	10:46:46	43,98	18,95	3,5	4-5
Kozara	2007.	10:43:30	45,11	16,98	3,8	5
Doboj	2007.	2:51:45	44,74	17,92	3,6	5
Prnjavor	2007.	6:37:58	44,83	17,60	3,5	4-5
Trebinje	2008.	13:26:05	42,56	18,60	4,7	6-7
Berkovići	2009.	8:55:38	43,03	18,21	3,2	4-5
Pale	2009	13:27:18	43,77	18,58	3,7	5
Pale	2009.	1:46:03	43,84	18,54	4,1	5-6
Kozara	2009.	12:11:06	45,07	17,04	3,8	5
Goražde	2009.	23:33:18	43,62	19,07	3,3	4-5
Rogatica	2009.	6:24:51	43,74	19,09	3,6	5
Volujak	2010.	23:51:33	43,26	18,67	3,4	4-5
Rogatica	2010.	6:54:00	43,79	19,02	3,1	4-5
Rogatica	2010.	18:52:55	43,78	19,03	3,1	4-5
Rogatica	2010.	1:46:02	43,79	19,03	3,6	5
Rogatica	2010.	18:41:56	43,77	19,05	3,5	5
Zelengora	2010.	6:16:02	43,43	18,59	3,6	5
Crvanj	2010.	5:23:17	43,43	18,20	3,1	4
Dragočaj	2010.	6:52:49	44,89	17,19	3,2	4-5
Zelengora	2010	11:28:57	43,42	18,59	3,6	5
Dragočaj	2011.	0:04:13	44,84	17,15	3,6	5
Trebinje	2011.	4:02:45	42,69	18,24	3,2	4
Fatničkopolje	2011.	11:13:51	42,99	18,35	3,2	4
Čelinac	2011.	23:30:44	44,75	17,37	4,3	6
Turjak	2011.	1:17:24	45,00	17,14	3,6	5
Treskavica	2011.	6:52:27	43,62	18,47	3,4	4-5
Višegrad	2012.	21:45:19	43,87	19,18	3,0	4-5
Region of Stolac	2012.	6:35:10	43,08	18,06	3,0	4
Volujak	2013.	18:52:26	43,26	18,70	4,1	6
Volujak	2013.	2:08:30	43,25	18,68	3,1	4-5
Volujak	2013.	3:37:16	43,25	18,68	3,8	5
Volujak	2013.	3:38:49	43,26	18,65	3,1	4-5

Volujak	2013.	11:55:49	43,23	18,70	3,1	4-5
Volujak	2013.	12:01:00	43,22	18,67	4,1	6
Volujak	2013.	4:12:12	43,22	18,69	3,1	4-5
Meštrevac	2013.	14:09:47	43,31	19,01	3,2	4-5
Srebrenica	2013.	5:16:41	44,02	19,23	3,1	4-6
Fatničkopolje	2013.	19:32:11	43,01	18,36	3,0	4
Srebrenica	2013.	2:16:03	44,06	19,32	3,0	4
Prača	2014.	4:08:20	43,80	18,83	3,2	5
Potkozarje	2014.	0:03:32	44,99	17,13	4,2	6
Region of Gacko	2014.	23:29:53	43,14	18,50	3,9	5-6
Laktaši	2014.	6:57:36	44,89	17,36	3,0	4-5
Region of Gacko	2014.	15:12:43	43,06	18,40	4,1	5-6
Region of Gacko	2014.	16:53:15	43,05	18,38	3,1	4-5
Krupa naUni	2014.	16:53:48	44,85	16,34	3,0	5
Fatničkopolje	2015.	2:38:37	43,04	18,37	3,4	5
Viduša	2015.	10:24:42	42,91	18,22	3,3	4-5
Banja Luka	2015.	13:57:17	44,85	17,29	3,1	4-5
Jahorina	2015.	0:05:32	43,75	18,56	4,2	6
Jahorina	2015.	2:08:08	43,75	18,55	3,2	4-5
Maslovare	2015.	16:16:50	44,52	17,56	4,0	5-6
Ljubinje	2015.	1:21:36	42,98	17,97	3,4	4-5
Ljubinje	2015.	3:48:00	42,98	17,97	3,6	5
Srebrenica	2015.	20:35:19	44,07	19,33	3,1	4-5

Literature:

1. Evropska komisija. (2014). Procjena potreba za oporavkom i obnovom u Bosni i Hercegovini. Brisel: Evropska komisija. Dostupno putem interneta stranicehttp://ec.europa.eu/enlargement/pdf/press_corner/floods/procjena-potreba-za-oporavkom-i-obnovom-sazetak-u-eur.pdf pristupljeno 15.01.2015.
2. European Commision. (2014). Floods in Bosnia and Herzegovina, Echo Joint Assessment Report. (2014). Bruxcells: European Commision, dostupno putem internet stranice: http://europa.ba/Download.aspx?id=1446&lang=BS, pristupljeno 15.01.2015
3. Deronja Suljić,. L., Bulić, M., Telić, D., Ćilimković, A. (2015). *Poplave u BIH – Elementarne nepogode i/ili institucionalna neefikasnost,* Tuzla: Centri civilnih inicijativa.
4. Republički zavod za statistiku Republike Srpske. (2017). *Popis stanovništva, domaćinstava i stanova u Republici Srpskoj 2013. godine*, Banja Luka: Republički zavod za statistiku Republike Srpske.
5. Republika Srpska Institute of Statistics. (2016). *Statistical Yearbook of Republika Srpska*. Banja Luka: Republika Srpska Institute of Statistics.
6. Republički hidrometeorološki zavod. (2017) *Seizmologija*. Dostupno putem interneta: http://rhmzrs.com/seizmologija/, pristupljeno 16.02.2017.
7. Ministarstvo bezbjednosti. (2010). *Informacija o poplavama i klizištima na području Bosne i Hercegovine tokom novembra i decembra 2010. godine*. Sarajevo: Ministarstvo bezbjednosti.
8. Šikman, M., Amidžić, G. (2014). Nadležnost i uloga policije u vanrednim situacijama u Republici Srpskoj, *Bezbednost*, 3, 129-147
9. World Bank. (2003). *Water Resources Management in South Eastern Europe, Volume II, Country Water Notes and Water Facts Sheets*, Washington: The World Bank.

10. Sinoptička analiza za maj 2014. godine. (2014). Republički hidrometeorološki zavod, Banja Luka. Dostupno putem interneta, http://www.rhmzrs.com/assets/images/meteorologija/sinopticka_analliza/maj2014.pdf pristupljeno 15.01.2015.
11. Zakon o zaštiti i spasavanju u vanrednim situacijama, Službeni glasnik Republike Srpske, 121/12.
12. Zakon o zaštiti stanovništva od zaraznih bolesti, Službeni glasnik Republike Srpske, 14/10