



Food and Agriculture
Organization of the
United Nations

Comprehensive analysis of Disaster Risk Reduction and Management System for agriculture in **Bosnia and Herzegovina**



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Food and Agriculture Organization of the United Nations
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Acronyms

AWAS	Agency for Watershed of Adriatic Sea
AWSR	Agency for Watershed of Sava River
BD	Brčko District
BH MAC	Bosnia and Herzegovina Mine Action Centre
BiH	Bosnia and Herzegovina
CCA	Climate Change Adaptation
CPA	Civil Protection Administration
CSOs	Civil Society Organisations
DRM	Disaster Risk Management
DRRM	Disaster Risk Reduction and Management
ESP	National Extension Services for BiH project
FBiH	Federation of Bosnia and Herzegovina
FHMI	Federal Hydro-meteorological Institute
MoFTER	Ministry of Foreign Trade and Economic Relations
NGOs	Non-Governmental Organisations
PDNA	Post-Disaster Needs Assessment
PFAP	Private Farmers Assistance Project
PHPA	Administration for Plant Health Protection
PRS	Sector for Protection and Rescue
RHMS RS	Republic Hydro-Meteorological Institute of Republic of Srpska
RS	Republic of Srpska
RSHMI	Republic of Srpska Hydrometeorological Institute
SOP	Standard Operating procedures
SVO	State Veterinary Office (SVO) of BiH
QMS	Quality Management Systems
WA	Water Agency
WASR	Water Agency for Sava River district
WATR	Water Agency for Trebisnjica River district

Introduction

Bosnia and Herzegovina (BiH) is prone to various natural hazards, including earthquakes, landslides, floods, droughts and storms due to its geological structure and climatic, topographic characteristics, which create a diverse set of hydro-meteorological conditions. The country has been hit by several large floods, in particular the devastating flood of May 2014, which substantially affected the agriculture sector.

This comprehensive study provides a general overview of Bosnia and Herzegovina's natural hazard and risk profile as well as its agriculture sector, which is followed by an analysis of the existing legal, policy and institutional structure. Various components, such as the functioning of early warning systems (EWS), post-disaster needs assessments (PDNA), disaster risk assessments and the availability of agricultural insurance for farmers are discussed. Finally, the report concludes by providing recommendations to further enhance and strengthen the system.

The analysis has been conducted through a desk study of secondary data sources, including disaster data from international disaster data bases, World Bank, FAOSTAT, FAO AQUASTAT and relevant laws, policies and strategic planning documents, reports and articles on the current disaster risk reduction and management institutional structure in Bosnia and Herzegovina with a specific focus on the agricultural sector. In addition, it includes some of the findings from a 2015 FAO study, which was developed as an output of the 'Capacity Building Needs Analysis for Emergency Preparedness and DRR/DRM Planning' project (SFER/GLO/001/MUL).

This report is prepared within the context of the FAO 'Enhancement of Disaster Risk Reduction and Management (DRR/M) capacities and mainstreaming of Climate Change Adaptation (CCA) practices into the Agricultural Sector in the Western Balkans' project (TCP/RER/3504) as well as under the regional initiative 3 on 'Sustainable Natural Resources Management in a Changing Climate' of the FAO Regional office for Europe and Central Asia. The recommended capacity building interventions in this document have the potential to be implemented in Bosnia and Herzegovina under this or other future projects aimed at reducing the adverse impacts of natural hazards, particularly floods, landslides and droughts, on the agriculture sector in Bosnia and Herzegovina.

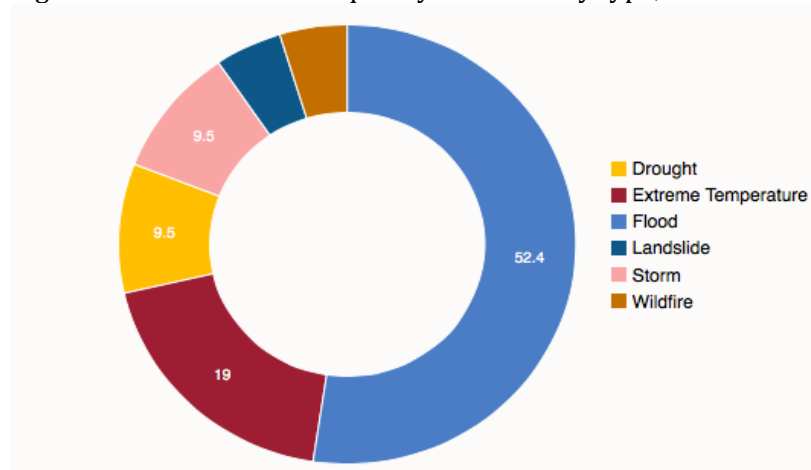
Disaster and risk profile

Bosnia and Herzegovina (BiH) is located in South Eastern Europe and is part of the Western Balkans countries. The country borders with Croatia in the north, west and southwest, with Serbia in the east and southeast and with Montenegro in the south. It has a total surface area of 51 209.2 km², of which approximately 210 km² is coastal area. Its coastline is about 21.2 km and is located in the Herzegovina-Neretva Canton of the Federation of Bosnia and Herzegovina (EUNETMAR, 2014).

The country is largely hilly and mountainous, with an average altitude of 500 meters. The Dinara mountains stretch from western border with Croatia to the south-eastern border with Serbia and Montenegro and are between 500 to 2 000 meters above sea level with Maglić as the highest peak of 2 386 meter. Of its total land area, 5 percent is lowland, 24 percent are hills, 42 percent are mountains and 29 percent karst regions. Bosnia and Herzegovina's longest river is the Sava, which forms a natural border with Croatia and Serbia, while the Drina river acts as a natural border with Serbia. In total, there are seven river basins, namely the Una, Vrbas, Bosna, Drina, Sava, Neretva with Trebišnjica and Cetina, of which 75.5 percent and 24.3 percent fall under the Black Sea and the Adriatic Sea catchment areas (UNDP in Bosnia and Herzegovina, 2016).

Due to its geological structure and climatic, topographic characteristics, Bosnia and Herzegovina is affected by different natural hazards, among others, earthquakes, floods, landslides, storms, droughts and wild fires. During the 1999–2014 period, floods have occurred the most frequently, as shown in figure 1 and have caused the highest economic losses (63 percent), followed by drought (36 percent).

Figure 1 Frequency of hazard by type, 1999–2014



Source: CRED-EMDAT

Floods are usually caused by rivers that overflow. Around 75 percent of the country is located in the transboundary Sava River Basin area. Several major floods affected Bosnia and Herzegovina, including in 1976 when three floods affected 43 of 109 municipalities and in April 2004 when 300 000 people were affected in 48 municipalities and 20 000 hectares of farmland was destroyed (WMO, 2012). The country received one of the largest amounts of precipitation recorded in the last 100 years in December 2010, which led to extensive flooding. The areas that were the most affected included those near the Drina river in central and eastern Herzegovina (EC, 2014).

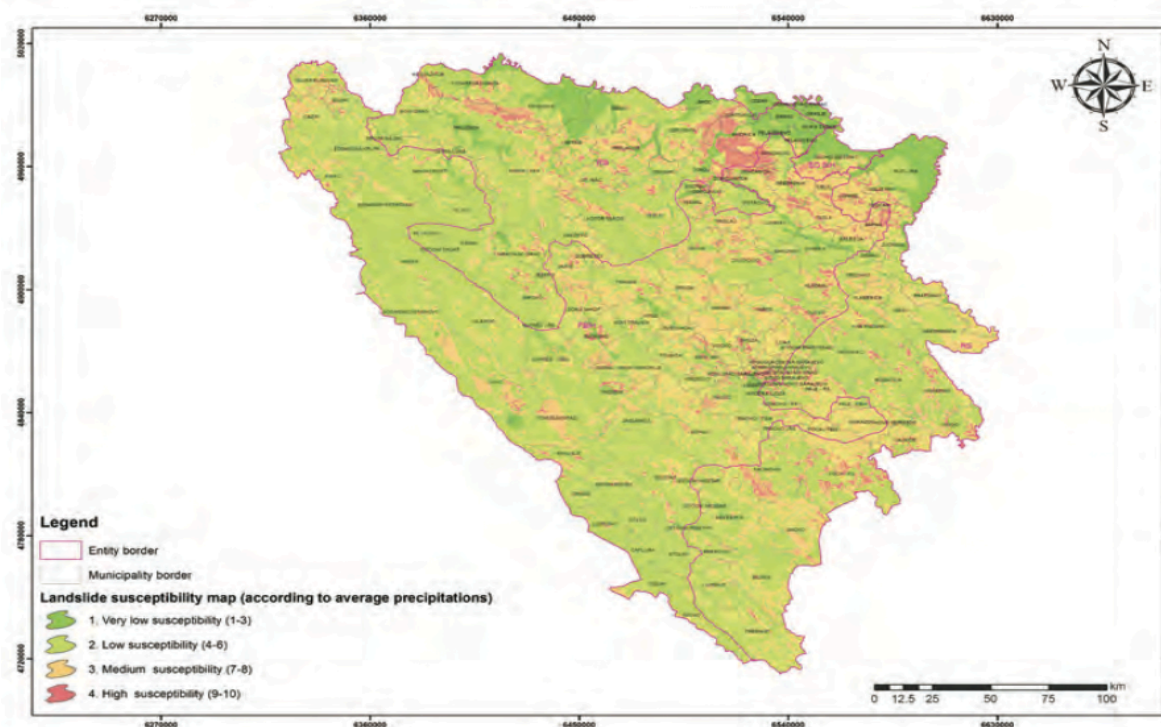
The heavy rainfall in May 2014 led to devastating floods across the Balkan region, hitting Bosnia and Herzegovina and Serbia the hardest. In Bosnia and Herzegovina, approximately 90 000 people were displaced and in total around 81 municipalities were affected. It was estimated that the total damage and losses was over Eur 2 billion, which is equivalent to 15 percent of the country's GDP in 2014. Over half of the damage occurred in the Federation of Bosnia and Herzegovina, which was estimated at Eur 1.04 billion, while the damage in the Republic of Srpska was about Eur 0.97 billion and in Brčko District Eur 0.30 billion. The agriculture sector was one of the sectors that was significantly affected with total agricultural damage and losses calculated at Eur 140 million, of which Eur 78 million in damage and Eur 62 million in losses (EU/UN/World Bank, 2014; EC, 2014).

Damaged flood control facilities due to the Bosnian war of 1992–1995, are one of the reasons why floods usually impact the Bosnia and Herzegovina and its people. In addition, flood protection infrastructure is often not regularly maintained, especially along the Sava river. When this river is flooded, the surrounding villages are thus highly impacted as well as in other areas of the country, where these facilities are also in poor condition. Environmental degradation, such as deforestation, intrusion in flood plains, construction in areas that are flood prone, are also among the reasons why heavy rains may result in extensive inundation and flooding across the country (EC, 2014).

Due to its geological and geo-tectonic structure, Bosnia and Herzegovina is dominated by two belts, namely the Dinaridic and the Sava-Vardar zone, located between the African and Eurasian plates. It is therefore susceptible to earthquakes, some of which have occurred over the past 100 years, for example the strongest earthquake was recorded in Banja Luka on 26 October 1969, which had a 6.4 on the Richter scale with damages estimated at USD 50 million (EM-DAT, 2017).

The occurrence of landslides in the mountainous areas of Bosnia and Herzegovina is quite common. In 2000, a large landslide happened in the area of Zenica and an increase in the number of landslides has been recorded from 974 to 1 312 during the period of 2007 to 2011 (Operta et al., 2014). Among the main trigger factors for the landslides that occurred in the country in 2006, 2010 and 2014 was precipitation (UNDP/Government of Japan, 2016). However, landslides usually happen in the mountainous areas as a result of, not only climatic conditions like heavy rainfall, long periods of droughts, melting of snow, but due to morphological and geological characteristics of a terrain, such as the presence of underground water flows, as well as anthropogenic activities to a large extent. These human activities, include e.g. deforestation, illegal and unplanned construction as well as mining. Figure 2 shows that the highest susceptibility of landslides is located in the north-eastern part of the country.

Figure 2 Landslide susceptibility map of Bosnia and Herzegovina



Source: EU, 2015

Another natural hazard that the agricultural sector in Bosnia and Herzegovina is highly vulnerable to is drought, especially in the north eastern and south western parts of the country. Drought usually occurs from June to September, particularly in the southern (Mediterranean) and eastern parts of the country. Among major droughts that have affected the sector in the last few years are those of 2002, 2003 and 2007 as outlined in table 1 below.

Table 1 Examples of the impact of droughts and floods on agriculture 2002–2012

Event	Year	Impact on agriculture
Drought, Worst in 120 years	Aug 2002	Decrease of agricultural production of 60 percent, led to serious food crisis
Drought, 4 months & storms	Summer of 2003	EUR 200 million damage to agriculture sector, affected approx. 200 000 people
Drought	Summer of 2007	Over 40 percent of the country's crop production destroyed and 250 hectares of land were affected by forest fires, led to high food prices
Drought	Summer and fall of 2012	Over USD 1 billion in agriculture production losses and 70 percent reduction in yields of grains and vegetables

Source: WMO, 2012; ICPDR, 2015

One of the recent droughts that affected the Western Balkans, and in particular Bosnia and Herzegovina, occurred in 2012, which was due to the culmination of a longer dry period that led to reduced water levels of rivers and groundwater. It was calculated that in 2012 the drought caused over USD 1 billion in agricultural production losses and reduced yields of grains and vegetables of up to 70 percent (Zurovec et al., 2015). The cultivation of maize was the most affected, which is the primary raw material for the production of animal feed. Other losses were incurred in the cultivation of e.g. barley,

soybeans, alfalfa, clover, beans, meadows and pastures, which resulted in a lack of fodder. This lack also adversely affected the number of livestock, livestock and milk production as well as the supply of meat for the domestic market. In turn, the drought led to an increase in food prices and a decline in the export of agricultural products.

Another drought hit the Balkan region in the summer of 2015, when the water balance anomalies were 100 mm below the long-term average. The peak of this drought occurred in Mid-August when rains brought some relief, but not enough to end the dry conditions, which continued until the beginning of October when the precipitation deficit was 180 mm (ICPDR, 2015). The 2015 drought affected the agriculture sector the most, however, exact damage and losses figures are lacking.¹

The most recent drought hit Bosnia and Herzegovina in the summer of 2017, which substantially impacted all agricultural subsectors. Unfortunately, the BiH government decided not to assess the damage and losses, due to the lack of financial resources for compensation.

Among the natural hazards, droughts are a substantial threat to Bosnia and Herzegovina, which result in significant economic, social and environmental costs. In particular, the agriculture sector is adversely impacted, due to its reliance on soil and water, which can be extensively depleted during these dry periods and lead to land degradation and soil erosion as well as biodiversity loss. The incidence of forest fires also increases during these dry conditions, which usually affect the most vulnerable groups, including smallholder farmer, women and children the most (UN-Water, 2013).

Climate change

Bosnia and Herzegovina has different types of climate, including the temperate continental climate in the northern and central parts of the country; the sub-mountainous and mountainous climate and the Adriatic and modified Adriatic type.

During the 1981–2010 period, the mean annual temperatures varied from 1.6 °C (Bjelašnica) to 15.2 °C (Mostar). While temperatures in summer ranged from 9.8 °C to 24.7 °C and temperatures in winter from -6.0 °C to 6.2 °C. Throughout the whole country, an annual temperature increase was observed, which ranged from 0.4 °C to 1.0 °C and more than 1.5 °C in the north-western part (Banja Luka) of the country.

Annual precipitation varies from 792 mm in the north-eastern part of the country (Semberija–Bijeljina) to 1 707 mm (Herzegovina-Trebinje), with less rainfall during the summer months. During the last two decades, there have been a slight increase in annual precipitation throughout the whole country, while there have been variations during the seasons. For instance, a reduction of 20 percent of rainfall occurred in Herzegovina during the spring and summer, whereas during fall an increase in rainfall was seen, particularly in the north-western and central parts of the country. Due to the increased variation between seasons and the changes in the distribution of rainfall, which combined

¹ At present, systematic collection of specific agriculture pre-disaster and post-disaster damage and loss data is often lacking. However, understanding the exact impact of natural hazards on agriculture and people's livelihoods is of utmost importance in order to better understand people's vulnerabilities and risks as well as to better inform decision-making and undertake effective risk reduction measures and investments.

with temperature rises have resulted in e.g. floods and droughts (UNDP in Bosnia and Herzegovina, 2016).

Over the past decades, extreme weather events seem to become more frequent in Bosnia and Herzegovina. The years of 2002, 2003, 2007, 2008, 2011, 2012, 2013, 2015 were considered very to extremely dry, while the floods of 2001, 2002, 2009, 2010, 2014 severely impacted the country's economy, people and their livelihoods (UNDP in Bosnia and Herzegovina, 2016). Due to climate change, it is expected that these hydro-meteorological hazards will not only increase in frequency, but also in severity in the coming years (IPCC, 2012).

Climate change projections for BiH indicate a continuous rise in temperatures and an initial increase that is followed by a decrease in precipitation from 2040s onwards. The different scenarios show an increase in temperature that varies from +1 °C to +2.4 °C during the period of 2011 to 2040 and from +3.8 °C to +5.6 °C during the 2041 to 2070 period. In terms of precipitation, an increase of +5 percent is expected for most of the country during the 2011–2040 period, while a reduction in rainfall is expected of about 10 percent for the 2041–2070 period and further decreases of between 10 to 20 percent for the 2071–2100 period, which are expected to lead to droughts (UNDP in Bosnia and Herzegovina, 2016).

The agriculture sector will be highly impacted by climate change due to its climate sensitive nature. It is expected that it will have a positive impact on the yield and quality of winter crops, such as fruits, including grapes, as a result of the longer growing periods as very cold winters and late spring frosts will disappear. Although, the cultivation of spring crops will be at risk due to the rising temperatures and water shortages during the summer and as a result the growing season for these crops may be reduced. It is also projected that there will be a decline in the yield and quality of pastures and feed, especially spring crops, as well as the expected depletion of pastures as a result of heavy rains and strong winds. Moreover, due to the longer the growing period as a result of the increasing temperatures in winter and early spring, the outbreak of more plant pests and diseases may also occur.

Challenges

Soils are eroded in the hilly areas, which are characterised by slopes of above 13 percent, and the mountainous areas, as a result of inappropriate ways of farming, lack of application of water and soil measures and preference given to the cultivation of row crops, including corn and potatoes (FAO, 2009). In addition, the land is degraded due to deforestation, the conversion of grassland to arable land and the uncontrolled cultivation in hilly areas, valleys and lowlands. It is very important that soil and water conservation practices are applied in the mountainous uplands in order to protect the lowlands and to ensure that interventions implemented in the low-lying areas, including embankments, drainage systems, river course direction and so on, will be ineffective.

Agriculture profile

Agriculture is still one of the most important sectors of the economy as it generates incomes and contributes to food security for a large part of the population. The sector contributes approximately 6 percent to the country's GDP (World Bank data, 2018). More than half (51.8 percent) of the total population of 3.5 million people (FAOSTAT, 2018) live in the rural areas and depend on the sector agriculture for their livelihoods. It is estimated that around 20.5 percent is employed in the sector and approximately 56 percent of all people who work in agriculture are female (FAOSTAT, 2015).

The primary natural resource that is crucial for the scope and structure of agricultural production is agricultural land and in particular its size, topographic characteristics and quality. One of the most important reasons of insufficient production of the basic agricultural products in BiH is insufficient and inadequate use of agricultural land. According to national statistical sources, BiH has 2.2 million ha of agricultural land, of which 1.6 million ha is arable land and 600 000 ha are pastures. RS has more agricultural land and plow land, in particular, if observed per capita, while FBiH has more meadows and pastures (BiH Agency for Statistics and RS and FBiH Institute of Statistics, 2016).

The most valuable land, in agricultural terms, (capability class I and II) in BiH is scarce, which is estimated to be around 300 000 ha. According to Bosnia and Herzegovina Mine Action Centre (BH MAC) data for 2016, the total mine suspected area in BiH covers 1 145 km² (2.3 percent compared to the entire area of BiH) with the largest area falling within the category of agricultural land. The majority of agricultural land, and in particular, arable land is privately owned. However, its distribution to around 350 000 rural households is unfavorable. In the absence of new data, those from 1991 are used according to which BiH had 291 000 farms with holdings of less than 2 ha with only 16 thousand farms with holdings of over 10 ha (BiH Institute of Statistics, 1983).

The situation has certainly changed and is probably even more unfavorable while the updated and reliable data could be expected only after the implementation of an agricultural census. The restitution regulations have not been passed and for now there is no possibility to reconstitute the seized agricultural land to their rightful owners or their legal successors. Comprehensive privatization of state-owned land is not foreseen as it could result in further fragmentation and even worsen the structure of the holdings. The impediments to development of an efficient market of private agricultural land include, among others, e.g. large fragmentation of agricultural land; disorderly state of land register and cadaster; lack of organized and systematic data on the supply and demand; lack of tax policy to systematically address the issue of neglected agricultural land; conversion of agricultural land into construction land; and, lack of favorable loans for purchase of agricultural land. To promote better use of agricultural land and support future application of area-based subsidies, it is necessary to establish an effective Land Parcel Information System (LPIS), based on the actual use of areas, using geographic information systems (GIS).

The majority of the farmers are small scale family holdings, which are mostly engaging in subsistence agriculture. It is estimated that two thirds of all the farms in Bosnia and Herzegovina have less than three hectares. The average farm size is three hectares, which

are often divided into 8 to 10 plots as shown in Table 2 (Statistical Bulletin of Institute of Statistics, 1983).

Table 2: Land size, number of farms and percentage of total area in Bosnia and Herzegovina

Farm size in hectares	Number of farms	% of total area
Up to 1	180 673	34
1-3	178 138	33
3-5	86 272	16
5-8	56 115	11
8-10	16 661	3
More than 10	14 669	3
Total	532 528	100

Source: Statistics Bulletin of Institute of Statistics, 1983

According to the FBiH Institute of Statistics (2015), in total 271 061 rural households are engaged in agriculture and its activities, which is a little less than a third (30.3 percent) of total number of households, of which almost 14 percent are selling their products on the market. In March 2017, a total of 69 542 farmers registered with the Farm Register, of which 2 986 registered legal persons and 66 556 family farms (Ministry of Foreign Trade and Economic Relations and the Council of Ministers of Bosnia and Herzegovina, 2018).

It is estimated that 140 960 rural households in the Republic of Srpska are involved in agriculture and its activities, which is 34.5 percent of total households and of which 18 percent are selling their products on the market. By the end of 2016, a total of 35 093 agricultural holdings were registered with the Farm Register, of which 603 were legal persons and 34 490 family farms (Ministry of Foreign Trade and Economic Relations and the Council of Ministers of Bosnia and Herzegovina, 2018).

Less than 20 percent of agriculture land (half of all arable) is suitable for intensive agriculture, which is the most valuable land resource and primarily located in the northern part of the country in the lowland river valleys (up to 300m). While the area for crop production is thus fairly limited, water resources are quite abundant, although before the war only approximately 10 000 hectares or 0.1 percent of arable land was irrigated. Forty-five percent of the country can be characterised as hilly (between 300–700m) and suitable for semi-intensive livestock production, while another 35 percent is mountainous (above 700m), which is solely used for grazing in spring and summer due to steep slopes and lower soil fertility (FAO, 2009).

In general, the agro-ecological zones are the following:

- Mediterranean zone and lowland river valleys (up to 300m), which is the 'region of southern crops' and where vegetables, fruits and grapes are developed;
- Hilly zone, between 300–700m, where row crops, such as corn and potato are grown;
- Mountain zone above 700m, where the main sown crops are rye, barley, oats and potato.

At present, over half of the agriculture land are meadows and pastures (56 percent), while the rest are ploughed fields (40 percent) and orchards and vineyards (4 percent) (FAO, 2009). Agricultural production in Bosnia and Herzegovina is mainly focused on crop production with livestock production contributing less than one third of the total output. The small increase that has been observed during the last few years was due to

the increase in cow milk production. In general, vegetables are the country's most important agriculture products, but fresh cow milk, maize and potatoes are also of great significance.

Table 3 provides an overview of the average yields of 9 years during the 2006–2014 period (data for 2015 was not available) of various agricultural products produced in the BiH Federation and Republic Srpska, Serbia and Croatia as well as with the EU. It shows that only BiH's raspberry production was higher when compared to its neighboring countries and the EU. As a result, there is still scope to enhance its productivity in almost all areas of its agricultural production.

Table 3 Comparative overview of average yields in BiH entities, neighboring countries and the EU, in t/ha (2006–2014 average)

Product	BiH Federation	Republika Srpska	Serbia	Croatia	EU
Maize	4.2	4.8	5.2	8.1	6.9
Wheat	3.6	3.4	3.8	4.8	5.3
Oat	2.6	2.5	2.2	2.8	2.9
Barley	2.8	3.3	3.3	3.9	4.4
Rye	3.3	2.6	2.4	2.7	3.4
Soya	2.1	1.8	2.6	2.5	2.7
Tobacco	0.9	1.6	1.6	2.0	2.3
Oilseed rape	2.2	2.3	2.5	2.7	3.1
Sunflower	0.9	0.9	2.3	2.8	1.8
Potato	9.6	10.7	11.4	16.4	29.9
Beans	1.3	1.4	1.6	1.2	1.6
Cabbage and kale	13.2	13.7	18.5	21.4	30
Tomato	11.3	10.9	11.6	32.3	57.4
Strawberry	9.3	4.7	4.8	10.2	10.7
Raspberry	7.0	7.6	5.6	3.2	4.4
Milk (kg/livestock unit)	2 236	2 800	2 980	4 007	6 279

Source: FAOSTAT, 2017

Bosnia and Herzegovina has a high foreign trade deficit and dependency on imports, in particular it is a net importer of agricultural and food products. The country's main export products include e.g. refined sugar, cow milk and sunflower oil, while wheat, raw sugar and maize are its main imported items. In 2011, over USD 1.3 billion food (excluding fish) was imported, while USD 329 million was exported, primarily from Croatia, Serbia, Brazil and Austria (FAOSTAT, 2011). In particular, the import of meat and edible meat increased almost four times between 2006 and 2015, while the import of fresh fruits and vegetables – even though BiH has favourable conditions – continued to increase as well as its the import of cereals. Moreover, its export of fresh fruits increased by almost five times between 2006 to 2015 and export growth was recorded with regard to its production of vegetable or animal origin oils, meat and meat products, and preparations of cereal and flour. While the export of its milk and dairy products increased only until 2013, which is when Croatia entered into the EU and stricter export rules were implemented (Ministry of Foreign Trade and Economic Relations and the Council of Ministers of Bosnia and Herzegovina, 2018).

Challenges

Due to the overall small plots of land in Bosnia and Herzegovina, the application of economies of scale is constrained in order to further enhance the agriculture productivity as well as it reduces the overall efficiency. In addition, as a result of the land fragmentation the adoption of more modern agricultural systems is restricted, which also

reduces the ability to sufficiently produce for the domestic and international agro-food markets.

The availability of the labour force in agriculture is also limited, due to e.g. low population growth, migration from rural to urban areas and abroad, despite that unemployment is a substantial issue in Bosnia and Herzegovina. The unemployment rate is approximately 20.8 percent in 2018 (ILOSTAT, 2018a), with a high unemployment rate of around 46.7 percent among youth aged 15–24 (ILOSTAT, 2018b). In the agriculture sector, due to the migration from rural to urban areas, the population is ageing with more and more older people remain to be engaged in the sector.

Legal and policy DRR framework

The Law on Protection and Rescue of People and Material Assets from Natural or other Disasters (hereafter referred to as the Law on Protection and Rescue of Bosnia and Herzegovina “Official Gazette BiH”, No. 50/08), adopted in 2008, lays the foundation for DRR/M at national level in Bosnia and Herzegovina. This law demands the establishment of a development programme, which includes the development of mechanisms for DRR. Agriculture is however not mainstreamed in this law.

At the entity level, the following legislative framework is relevant for DRR/M:

- Law for protection and rescue of people and goods from natural disasters in FBiH (“Official Gazette of FBiH”, no. 39/03, 22/06 i 43/2010);
- Law for protection and rescue in crisis situations of Republic of Srpska (“Official Gazette of RS no. 121/2012).

These laws define various roles and responsibilities, including the tasks to conduct risk assessments as well as establish protection and rescue plans. The Republic of Srpska and the Federation of BiH have developed these plans in 2003 and 2008 respectively, while such a plan does not exist for Brčko District.

Bosnia and Herzegovina has adopted the Sendai Framework for DRR (2015–2030) and its predecessor the Hyogo Framework for Action (HFA) 2005–2015, which reflects the country’s commitment to reduce its disaster risks and build the people’s resilience. This 15-year voluntary and non-binding agreement aims to substantially reduce “disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries” (UNISDR, 2015: 12).

There is currently no law that clearly defines the roles of the hydro-meteorological services at state level and as a result, there is no institutes at national level. In the FBiH, the roles and responsibilities of the Federal Hydro-Meteorological Institute, with regard to floods and droughts, are outlined in the two laws:

- Law on Federal Ministries and other authorities of the Federal Administration (Official Gazette FBiH, no. 19/03);
- Law on Hydro-Meteorological affairs of interest to the Republic of Bosnia and Herzegovina (Official Gazette RBiH, no. 10/76), which is one of the laws that

originates from the former Republic of Bosnia and Herzegovina and the former Socialist Federal Republic of Yugoslavia.

While the relevant laws for the Republic Hydro-meteorological Service of the Republic of Srpska, with regard to floods and droughts, are:

- Law of Administration of the Republic (Official Gazette of RS, no. 11/08);
- Law on meteorological and hydrological activity in the Republic of Srpska (Official Gazette of RS, no. 20/2000)

Within the context of flood risk reduction, the Law on Water at state level is relevant for DRR. In addition, the entity laws on water are important, which outline the roles and responsibilities of the Federal Hydro-Meteorological Institute in FBiH and the Republic Hydro-Meteorological Service in the Republic of Srpska:

- Water Law (Official Gazette of the Federation BiH no. 70/06);
- Regulation on the types and the contents of the plans for the protection from harmful effects of water (Official Gazette of the Federation BiH no. 26/09);
- The Law on Water RS (Official Gazette no. 01-557/06);
- Flood Risk Directive (Official Gazette of the Republic of Srpska, no. 50/06).

For instance, section 90 of the Law on Water RS focuses on flood protection and consists of the implementation of activities and measures that prevents and mitigates the vulnerability of people and property from flooding. Among others, the local governments of the Republic of Srpska should facilitate planning of the protection measures as well as support the construction and management of protection facilities, such as dams and dikes.

In terms of sectoral laws, the Law on Agriculture, Food and Rural Development (Official Gazette of BiH 50/08) was adopted in 2008. This law aims to harmonize agricultural policies at the State level and outlines legislation, objectives, principles and mechanisms for the establishment of strategies and policies, including those that support agricultural markets and rural development measures. The former are measures that focus on improving the quality of products as well as those that give direct support to agricultural producers and those related to foreign trade. Whereas the rural development measures strive to enhance competitiveness, protect the rural environment, diversify rural activities and improve the quality of life in these areas. It further presents the institutional structures and responsibilities at all levels. According to this Law, the agriculture sector covers, among others:

- Agriculture and food (production, processing and distribution);
- rural development;
- forestry and forest products;
- fisheries and fish products;
- water management;
- agricultural machinery, equipment and facilities;
- agricultural land;
- agro-environment;
- trade in agricultural and food products;
- veterinary and animal health;
- plant health and protection.

However, this sectoral law does not include DRR or any reference to prevention, mitigation and preparedness.

National relevant DRR and sectoral plans, policies and strategies

At present, a national DRR plan, policy or strategy does not exist for Bosnia and Herzegovina and this is also not mandated by law. However, the Ministry of Security, through the Sector for Protection and Rescue, does consider the mainstreaming of DRR into its national policy important. However, the Republic of Srpska has established a protection and rescue plan in 2003 and the Federation of BiH adopted one in 2008, although the focus is mostly on emergency response and recovery, while Brčko District does not have one yet.

However, the country is preparing several hazard plans in accordance with the requirements set out by the EU Flood Directive to which Bosnia and Herzegovina wants to adhere to even though they are not obliged as they are not yet a Member State of the EU. There are some flood plans that are being developed in collaboration with other countries due to the transboundary river basin to which these countries belong. One example is the Sava River Commission, which prepared the Sava River Action Plan in 2009 in line with the Flood Directive that focuses on prevention, protection and preparedness. In addition, the Republic of Srpska was also involved in the preparation of the action plan for the sustainable flood risk management in the Danube Basin for the 2010–2021 period, with specific reference to the sub-basin of the Sava river.

BiH Strategic Plan for Harmonization of Agriculture, Food and Rural Development (2008–2010)

This strategy does not mention DRR nor natural hazards or examples of these hazards and climate change. The document is expired and is replaced by the recent agricultural strategy for the country as described below, where DRR is to a certain extent integrated.

Strategy for Agriculture and Rural Development of Bosnia and Herzegovina 2018–2021

This document focuses primarily on establishing a framework, including targets, priorities for the sustainable development of agriculture and rural areas, within the context of the implementation of EU accession policy during the period of 2017–2025.

One of the measures mentioned include ‘support for organic production, environment protection and reducing the impact of climate change’. Other relevant chapters and measures in the strategy are ‘support for diversification in rural areas’, ‘support for veterinary and phytosanitary systems and services’, ‘cross-cutting initiatives’.

DRR is linked to CCA and risk management is mentioned within the context of support provided to help prevent or mitigate the effects of climate change and the challenge of growing food production needs within the agro-environmental chapter. Options for supporting crop insurance schemes are mentioned so that crops that will be affected by extreme weather events due to climate change can be covered and this support can be further explored and potentially piloted. Moreover, the importance of assessing and monitoring climate change effects, supporting scientific innovations and disseminating this knowledge and information is acknowledged to be developed and implemented. In addition, the need for investments provided to agricultural holdings so that they can apply new technologies and practices, such as e.g. the implementation of agro technical measures and systems of cultivation and management, which can help to reduce the impact of climate change through these innovative solutions.

In addition, a number of agro-environmental issues is mentioned. For instance, the livelihoods of the rural population are undermining ecosystems, among others destroying natural resources, which results in a lower quality of agricultural plant and livestock products. These issues are many related to inadequate and uncontrolled use of pesticides, inadequate management of soil fertility and use of fertilizers. Furthermore, environmental management is relatively inadequate with regard to livestock production at medium and large cattle farmer and there is still a low level of environmental awareness among the agricultural producers. In this regard, the sustainable management of natural resources is linked to the importance of the conservation of valuable landscapes and of improving biodiversity to mitigate and protect the sector by raising the awareness of climate change (Ministry of Agriculture, Water Management and Forestry of the FBiH, 2016).

Strategy of Agriculture for Federation of Bosnia and Herzegovina for 2015-2020

This document includes the connection between natural resources management and sustainable agriculture, although no rational on DRR is included. It also mentions the importance of establishing appropriate implementation mechanisms and incentives in line with international obligations, in particular those related to EU integration, with regard to promoting sustainable agricultural practices and the sustainable use of land and water management, including biodiversity and landscape protection and preservation.

Natural hazards, such as floods, storms and landslides, are mentioned within the context of climate change, which are expected to increase in frequency and intensity during the century. The document mentions the expected decrease in yields due to reduced precipitation and increase evaporation, as well as a potential decrease in livestock productivity and increased incidence of agriculture pests and crop diseases as a result of climate change. Although, at the same time due to the prolonged vegetation, it is expected that the growing season will expand, which will increase the potential for cultivation of some crops in the country.

A link between DRR and CCA is also established as mentioned on page 41 of the document, within the chapter 'Challenges of Agriculture of Federation Bosnia and Herzegovina' that *"climate change is reflected in the identified temperature increase and frequent weather conditions (drought, flood, hail stones, storms, etc.). These changes are*

caused by changes in the vegetation period (start, duration), precipitation schedules (availability of water), increased risk for producers in terms of frost, hail stones, drought, and an increase in the incidence of diseases and pests."

DRR is not a self-standing outcome, but it has been linked to natural resources management, in particular for reducing the impact of drought, such as the use of irrigation to mitigate the impact of this natural hazard as well as the diversification of rural activities.

Several DRR measures are mentioned in the document, such as the need to enhance the irrigation system in order for agriculture to address climate variability and climate change as well as the importance of water management interventions, such as channel construction and reservoirs to reduce the impact of droughts. Other land management practices that focus on the reduction of soil erosion and drought risk reduction, such as the application of crop rotation, changes in the sowing dates, increasing the water capacity of the soil and storage and enhance soil fertility such as organic agriculture mixing less productive crops resistant to drought with high productive species that are drought-sensitive, as well as the development of drought-resistant varieties and improving agro-climatic monitoring and early warning systems to enhance preparedness for response. In addition, awareness raising and educating farmers about climate change and its impact on agriculture is stated and the importance of an insurance scheme. Moreover, commodity reserves in BiH exist at the entity level and in FBiH at the cantonal levels and can be used during emergency situations (Ministry of Agriculture, Water Management and Forestry of the FBiH, 2014).

The strategy does not include any reference to one of the international DRR or other related agreements such as the Paris Agreement or Kyoto Protocol. However, it does acknowledge that the conditions for agricultural production are changing and expected to change in the future due to climate change and that the sector requires institutional support as well as technologies to be developed in order to adequately address these challenges and provide a response that is appropriate to the intensity of these changes. This may require among others, changes in the approach to agricultural production, the implementation of certain technical and technological practices, different animal breeds as well as the application of a number of additional agro-technical measures in order to enhance competitiveness.

It states that agricultural policy must promote the modernization of the sector, primarily in the direction of technical and technological modernization, and less towards the measures that mitigate the consequences of climate change. However, it does mention that it is important to strengthen the capacities of all sectoral stakeholders in terms of enabling adequate risk management (e.g. forecasting and reporting services), water and land (e.g. increasing the ability to increase the soil's capacity to infiltrate and retain retain water, enhancing the protection from erosion, increasing soil fertility and so on), as well as the prevention of the occurrence of diseases and pests, such as the monitoring of diseases, resistant varieties and breeds etc.

The institutional and technical capacities to enhance the development and implementation of climate policy, the planning, monitoring of greenhouse gas emissions as well as verification of mitigation activities is considered a priority for FBiH in order to

reduce the effects of climate change. In addition, the coordination between the different state and entity level organizations for implementing their activities in line with the agricultural sector strategies in the country is outlined in the Law on Agriculture, Food and Rural Development of BiH. For instance, the state level organizations should initiate the development of guidelines for the operation of commodity reserves in accordance with the practice applied in the EU, such as in terms of transparency and traceability of data and procedures.

Agriculture, Food and Rural Development Strategy of Brčko District (2008–2010).

The Agriculture, Food and Rural Development Strategy of Brčko District for 2008–2010 was developed, but unfortunately it was never adopted. This strategic document mentions that Brčko District of BiH has been inundated quite frequently during the past several years, especially the regions of Gornji Rahic and Islamovac have substantial issues related to soil erosion due to illegal logging. When floods occur in these regions, by heavy rainfall, it causes extensive damage.

It also identifies poor rural households as those highly vulnerable to natural hazards, such as droughts and floods due to their limited resources. This is a result of, among others, limited access to credit and financial resources as loans to farmers are often considered to be risky from a financial institution perspective, also because most do not own their house or land that can act as collateral. As the agriculture sector is considered to be one of the drivers of BiH's economy, the Department of Agriculture of the Government of Brčko District addresses the issue of financial access by providing favourable loans to farmers (Government of Brčko District, Department of Agriculture, Forestry and Water Management of Brčko District, 2008).

Climate change is not mentioned nor the importance of prevention, mitigation, preparedness for response and so on. However, the application of the appropriate measures to reduce the impact of floods and soil erosion is acknowledged. There is no clear link established between natural hazards and biodiversity unfortunately, but this could be easily included in Chapter 2 'Agriculture and the level of Environmental Protection'. As a result, DRR mainstreaming in this strategy is limited.

Strategic Plan for Rural Development of Bosnia and Herzegovina (2018–2021)

The rationale of the document does not include the mentioning of disaster risk reduction or climate change. It is included under threats to the development of agriculture and rural areas in BiH as part of the SWOT analysis that was undertaken and included. Climate change is also mentioned under opportunities as an important challenge for defining strategic commitments, mechanisms of action and identifying concrete measures.

One of the five main strategic goals for the development of agriculture and rural areas in Bosnia and Herzegovina for 2018–2021 is strategic goal 3, which focuses on 'sustainable management of natural resources and climate change adaptation'. The adverse impact of extreme weather events due to climate change on agriculture is acknowledged and the need to develop more mixed cropping farming systems and more diverse farmer management practices emphasized. Furthermore, it is mentioned that the risks are expected to increase and therefore the need to address the impact of climate change, to

help with risk management and strengthen the provision of advice, training and information to help the sector cope. Thereby, foreseeing a possibly guiding role to apply, where relevant, EU experience and best practices.

It has the aim to promote and strengthen agricultural practices that are favourable to the environment and in this respect the importance of conserving valuable landscapes, strengthening the system of water management in agriculture, raising awareness of climate change, its consequences and methods to mitigate or protect the sector against such changes. Including improving biodiversity and conservation of indigenous genetic resources, improving land fertility and establishing and strengthening the mechanisms for sustainable land management. Natural hazards are only mentioned within the context of land mine contamination on some agricultural land as a considerable issue since these mines may migrate due to land movements as a result of e.g. floods and landslides.

Under its fifth strategic goal on ‘improving institutional systems and capacities and harmonization of the legal framework in agriculture and rural development, at all government levels with the aim of gradual approximation to the EU CAP’, there are relevant DRR measures mentioned. For instance, within the context of natural resource management it states that there will be a need to continue supporting the conservation of genetic resources and support the organization of genebanks for plant and animal resources. In addition, there is a need to strengthen the public and private extension services in agriculture at all levels as well as improving the qualifications of extension officers as well as providing them with regular training to help with the further dissemination of knowledge on e.g. the use of new technologies, responsible management of natural resources, alleviating and adapting to climate change.

Specific DRR related measures for agriculture are mentioned, such as support for the protection and promotion of indigenous plant and animal species. For instance, animal breeds, like the Gatacko cattle, Busa (Busha) cattle, Pramenka and the protection of various plant varieties and indigenous plant genetic resources through the establishment and/or strengthening of dedicated gene banks. In addition, support through advisory services to help with risk management and the adaptation of farmers’ agricultural productions systems to climate change, such as the exploration and potential piloting of crop insurance schemes, the monitoring of climate change effects, support for scientific innovations and dissemination of knowledge and information.

In particular, strengthening capacities for the management of disease crisis situations and outbreaks / contingency planning as well as supporting programs to reduce the effects of climate change on agricultural production are considered high priorities, while the developing programs to support the conservation and sustainable use of genetic resources is considered a medium priority. These three relevant DRR measures are included in the indicative action plan table in the strategy document, however, no specific actions, indicators, timelines, responsible actors are outlined for any of these measures.

There is no reference to international agreements, such as the Sendai Framework for Disaster Risk Reduction or its predecessor the Hyogo Framework for Action nor the Paris Agreement, except for the United Nations Convention to Combat Desertification/Land Degradation (UNCCD) within the context of describing its issue of land degradation,

disturbance of land and loss of productive agricultural land, such as through soil erosion, but this is not linked to natural hazards.

Agricultural and Rural Development Strategy of Republic of Srpska 2015–2020

The rationale of the document does not include much information on natural hazards or DRR, except it emphasises drought prevention. DRR is not mentioned as a stand-alone strategic goal, but there is a strategic goal that is titled ‘sustainable development of natural resources and mitigation of climate change’. Emphasis is on the improvement of fertility, quality and cultivation of agricultural land and providing financial incentives (co-financing) of re-sowing and enrichment of grasslands.

DRR is not integrated as part of the ‘rural development policy’ outcome either, however, the importance of agriculture support for innovation, research, knowledge enhancement is described. There are policy measures for agriculture, which are supported with on average KM 6.9 million (approximately USD 4.2 million) or eight percent of the total budget support to agriculture and rural development. Within these support measures, significant activities have been implemented to strengthen institutional capacity, such as scientific research institutes and activities of other institutions for the implementation of significant projects, such as e.g. the registration of agricultural holdings, production of seed material, veterinary protection, and so on. In total, 719 projects related to business activities of cooperatives and associations were supported, while KM 3 million (around USD 1.8 million) was allocated to support the education of staff and enhancement in knowledge and skills of human resources in the rural area. Moreover, there are significant funds allocated for intervention (including emergency response) measures related to reducing the impacts of natural and biological hazards, such as droughts, floods, fires, storms, diseases and pests, as well as market interventions in the form of intervention purchase of products. On an annual basis, financial resources over KM 3 million (about USD 1.8 million) have been allocated for these purposes (Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska, 2015b).

DRR is also not included as a self-standing output, but integrated into the natural resource measure, also more for land issues, such as repair costs for soil or some roads, not as a real DRR output. In addition, there is one measure related to land degradation and irrigation for mitigating the impact of drought.

Although, no reference is made to international agreements like the Sendai Framework for Disaster Risk Reduction nor to other related agreements, such as the United Nations Convention to Combat Desertification (UNCCD). There is also no linkage described between DRR and CCA.

As a result, DRR is not systematically mainstreamed through this planning instrument and integration could be recommended in some chapters that mention CCA, for example within the chapter on development goals, environmental protection and climate change, which is currently connecting more the promotion of investments in the production of energy from plant waste (bio-energy) and organic fertilizers. Other investments mentioned, such as those in irrigation and drainage are advocated to be implemented in a wider territorial area. These investments are considered to provide long-term effects,

both in terms of increasing production volumes and productivity as well as mitigation of the effects of climate change.

In addition, there is a chapter on 'rural development policy', which does not include the impact of natural hazards on agriculture, however, it does mention the importance of employment for the population in rural areas, as well as the sustainable use of land, forests and other natural resources so that they remain available for the next generations and in this regard it is mentioned that as little chemicals for a agriculture production so that land and water resources are polluted as little as possible.

Rural Development Strategy of Federation of Bosnia and Herzegovina 2016-2020

There is no mentioning of any natural hazards as well as DRR is not included in the rationale of the document. However, natural hazards are mentioned in relation to land mines under agricultural land, which remain a substantial issue especially in areas affected by e.g. floods, landslides etc., where the mines may have shifted due to land movements. In addition, there is a link established between agriculture, climate change and sustainable management of natural resources within the 'strategic measures' chapter. It highlights the importance of raising awareness of climate change and mitigates the effects on the sector in order to protect agriculture against these changes.

In addition, disaster risk reduction (DRR) and climate change adaptation (CCA) is included. Some reference is made to current CCA and the importance for FBiH farmers to adapt, namely in the "Strategic measures chapter", there is a section titled "Climate change risk management and mitigation". This section describes the effects of climate change on agriculture in BiH, which includes e.g. the increase in extreme weather conditions which have led to more frequent and heavy precipitation and flooding, erratic changes in temperature and more unpredictable seasonal conditions for certain crops. These changes have already had significant negative impacts on the yields of certain commodities.

Furthermore, the document states that these climatic changes will gradually impact the choice and range of crops and require the development of more mixed cropping farming systems and more diverse farm management practices. As a result, the risks to the incomes from agricultural holdings, the quality of life and the socio-economic status of rural households are gradually increasing. It further mentions that therefore, sub-measures will be developed and implemented to assist farmers in addressing the impact of climate change as well as helping with risk management and strengthening the provision of advice, training and information to help the sector cope with the changing conditions, which will be guided, where relevant by EU experience and best practices as mentioned on page 41 of this document (Ministry of Agriculture, Water Management and Forestry of the FBiH, 2014).

Furthermore, under the 'Climate change' section within the 'Strategic measures' chapter, this strategy mentions that support will be provided to farmers to promote the introduction of new technologies that can help prevent or mitigate the effects of climate change and respond to the challenge of growing food production in line with the increase food demand and needs. Specifically it describes the following:

“Support through advisory services will also be promoted to help farmers to adapt agriculture production systems to respond to the effects of climate change and help with risk management. Options for support for crop insurance schemes that extend cover for crops affected by extreme weather conditions caused by climate change will also be explored and potentially piloted. Monitoring systems to assess the climate change effects and support for scientific innovations and dissemination of knowledge and information in this area will also form part of the responses to be developed and implemented. In addition, investment support provided for agricultural holdings will be designed to prioritize the funding of new technologies and practices (such as application of agro technical measures, assortments, systems of cultivation and management) that contribute to the reduction of global warming and/or provide innovative solutions.” (Sabahudin Bajramovic, 2015)

Although limited DRR options and measures were outlined, support for crop insurance schemes was included, which is currently not yet supported by the BiH government (see the section on agriculture insurance). Furthermore, there were no specific outputs nor indicators included.

DRR is currently not integrated into the "Natural Resources Management" component of strategy and no reference is made to international DRR frameworks and agreements like the Sendai Framework for DRR 2015–2030. As a result, there is substantial scope for the mainstreaming of DRR throughout this document.

Main stakeholders for DRR in agriculture

The institutional structure in Bosnia and Herzegovina (BiH) is complicated. This is the result of the peace agreement, also known as the Dayton Peace Agreement (DPA), that was reached in November 1995 and formally signed in Paris on 14 December 1995. This agreement concluded the Bosnian war that lasted 3.5 years. The constitution of BiH is included in the DPA and states that the country is a decentralized state, which consists of two entities: The Federation of Bosnia and Herzegovina (FBiH) and the Republic of Srpska (RS). Each entity has their own constitution, government and parliament as well as their own budgets and act independently. In addition, there is Brčko District (BD), which is located in the north-eastern part of the country and is by decree independent from the entities. Brčko District operates under the administrative rule of the BD government and under exclusive sovereignty of BiH.

In addition, the overall Federation of BiH is made up of ten cantons, each of which consists of municipalities. Cantons also have their own governments and parliaments, which can develop policies and adopt laws pertaining to their competences, as well as their own budgets and also act independently. There are in total 79 municipalities, whose activities are financed and supervised by the cantons. The Republic of Srpska (RS) does not have any cantons, but instead consists of municipalities and cities. It shares some of its competences directly with the 63 municipalities that located in its territory (FAO, 2015).

In terms of the main stakeholders for DRR are the Sector for Protection and Rescue (PRS) – Ministry of Security of Bosnia and Herzegovina. While at entity level, the following institutions are involved, in the Federation of Bosnia and Herzegovina:

- Civil Protection Administration (CPA);

- Federal Hydro-Meteorological Institute (FHMI);
- Agency for Watershed of Adriatic Sea (AWAS);
- Agency for Watershed of Sava River (AWSR).

Whereas in the Republic of Srpska, the following organisations are included:

- Civil Protection Administration (CPA);
- Republic Hydro-Meteorological Institute of Republic of Srpska (RHMS RS);
- Water Agency for Sava River district (WASR);
- Water Agency for Trebisnjica River district (WATR).

In short, at the state level, the overall coordination is under Ministry of Security, which coordinates with the different Ministries at State level, followed by the involved Ministries at Entity level, while the coordination with the local level is the responsibility of the Entity Ministries. At the local, municipal level, the local government staff is involved in the assessment of local risks and threats as well as in the coordination of resources and activities and the organization of the rural and urban communities. More detailed information is provided in the following section.

Sector for Protection and Rescue

The Ministry of Security and in particular the Sector for Protection and Rescue leads the DRR efforts at the national/state level. It is also involved when a large-scale event, cannot be solved at entity level. In this case, the Sector for Protection and Rescue as well as the Coordinating Body of Bosnia and Herzegovina takes the lead to manage and coordinate the protection and rescue activities, even though at entity level, there are Entity Civil Protection Administrations for FBiH and RP exist as well as the Department for Public Security of Brčko District. The Coordinating Body consists of the Council of Ministries, which includes the heads of the relevant ministries, five representative members each from the FBiH and the RS and two from Brčko District as well as the Chairman of the Coordinating Body, who is also the Deputy Ministry of Security of Bosnia and Herzegovina.

The Ministry of Security has the responsibility to conduct planning and coordinate the civil protection and risk reduction activities of the entities and Brčko District as well as exchanges relevant data and information. It is further tasked to approve the developed protection and rescue plans and programmes.

The Sector for Protection and Rescue of the Ministry of Security of Bosnia and Herzegovina is established in 2004 and managed by the Assistant Minister, Head of Protection and Rescue Sector. It consists, according to the relevant legislation² of 3 departments, including the department for international cooperation and coordination, the department for strategic planning and protection and rescue measures and the department for structure and training. The Sector for Protection and Rescue was tasked in 2009 to set up an effective disaster management and coordination agency as well as an operational 112 center. In addition, according to the State Law, it led efforts to establish strategic documents regarding risk assessment and its methodology as well as an emergency response plan. It is also in charge of the protection and rescue coordination

² As outline in the constitution of BiH, the Framework Law on Protection and Rescue and the Entity Laws on Protection and Rescue/Civil Protection.

activities, including inter-institutional coordination with the Ministry of Defense and other relevant organisations.

The operational 112 centre is part of the Sector for Protection and Rescue and manages the operational centres of the relevant agencies of BiH as well as the centres of Brčko District. It is responsible for the collection and dissemination of data and natural hazard and other warnings to provide timely alerts to the population as well as it is tasked to develop mechanisms to collect, store and disseminate disaster related data.

When a large-scale event happens at local level, the entities request the Coordinating Body proposes the declaration of a state of natural or other disasters to the Council of Ministers as well as it terminates it. Furthermore, this agency helps to coordinate the protection and rescue as well as prevention and preparedness activities of the entities and the other relevant organizations.

Water Agencies

At present, there are four water agencies in BiH, of which 2 located in the FBiH and 2 in the RS. These are the following:

- Agency for Water Catchment Area of the Adriatic Sea Mostar, FBiH;
- Agency for Water Catchment Area of the Sava River, FBiH;
- Agency for Water Catchment Areas of the Sava River Basin Bijeljina, RS;
- Agency for River Basin Water District of Trebišnice River from Trebinje, RS.

These four agencies are set up by the Ministry of Agriculture, Forestry and Water Management, and are in charge of the implementation of the long-term, middle-term and annual water sector development plans, namely related to the following issues of, among others:

- The mitigation and protection against floods;
- The construction, operation and maintenance of water sector facilities;
- The operation and maintenance of the independent regional water supply systems and to link them to the municipal network;
- The development of drafts and technical studies for routine maintenance and rehabilitation;
- The participation in the organization and implementation of research related to the water sector;
- The monitoring and control of water use.

As mentioned under the flood risk assessment section, the Water Agencies are involved in the initial flood risk assessment, flood risk mapping and the preparation of the flood risk management plans, which are requirements of the EU Flood Directive, which Bosnia and Herzegovina aims to adhere to even though they are not obliged as they are not an EU Member State yet.

The National Platform for DRR was established in 2013 and resides under the Ministry of Security (Sector for Prevention and Rescue). The Platform act as a permanent forum, where opinions are exchanged as well as proposals and achievements that contribute to disaster risk reduction across the various areas are discussed. In addition, it helps to enhance inter-institutional collaboration and coordination among the relevant stakeholders, such as representatives from the Protection and Rescue authorities in BiH,

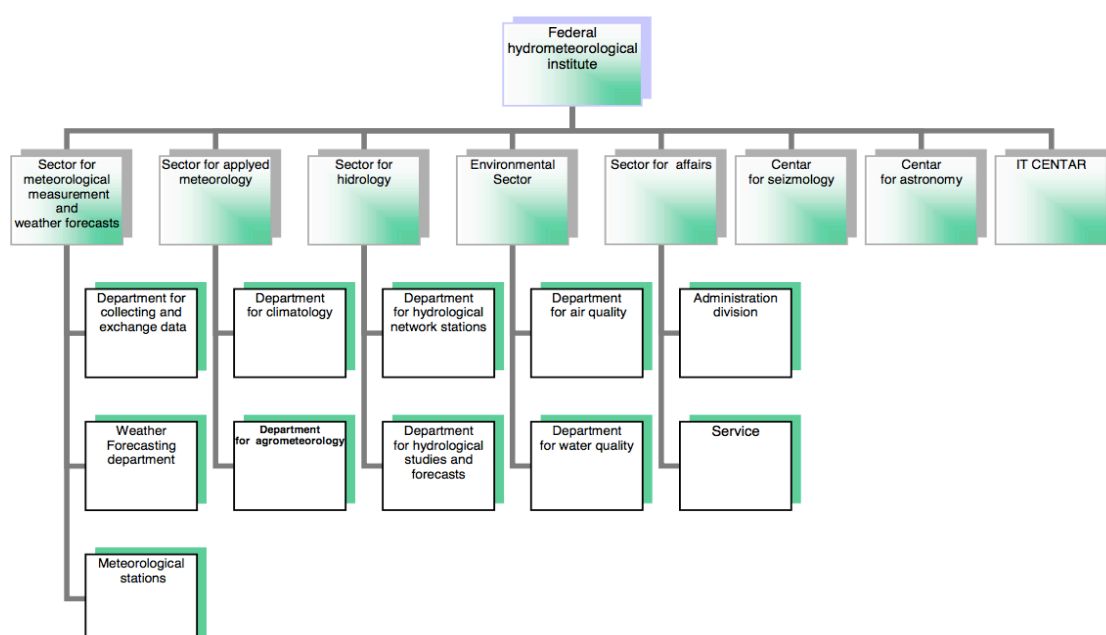
governmental bodies, scientific and academic institutions, the private sector, Non-Governmental Organisations (NGOs) and Civil Society Organisations (CSOs) as well as international and regional organizations.

Hydro-meteorological institutes

There is no national hydro-meteorological institute, but there are two hydro-meteorological institutes in Bosnia and Herzegovina, of which the Federal Hydro-Meteorological Institute (FHMI) is located in Sarajevo in the Federation of Bosnia and Herzegovina³, whereas the Republic Hydro-Meteorological Service of the Srpska Republic in Banja Luka in the Republic of Srpska⁴. There are no hydro-meteorological institutions in the Brčko District.

Even though FHMI is an independent organisation, it is being overseen by the BiH Ministry of Civil Affairs for meteorology, the BiH Ministry of Foreign Trade and Economic Relations for hydrology as well as the BiH Ministry of Security for seismology. FHMI is involved in the collection and analysis of data as well as the monitoring of meteorology, hydrology, seismology and astronomy, water resources, environment (water, soil, air) among others. It provides and publishes information related to the weather, climate and water, including daily weather bulletins and forecasts. It also provides hazard information on request, provides sectoral advice as well as historical hydro-meteorological data for risk assessments. Figure 3 gives an overview of the institutional structure of FHMI.

Figure 3 Organogram of FHMI



Source: WMO, 2012

According to the regulation on the types and contents of the plans for the protection from the protection from the harmful effects of water (Official Gazette of the Federation BiH no. 26/09), the Federal Hydro-Meteorological Institute in FBiH has the following responsibilities in the event of a flood e.g.:

³ For more information see <http://www.fhmzbih.gov.ba/latinica/index.php>

⁴ For more information see <http://www.rhmzrs.com/>

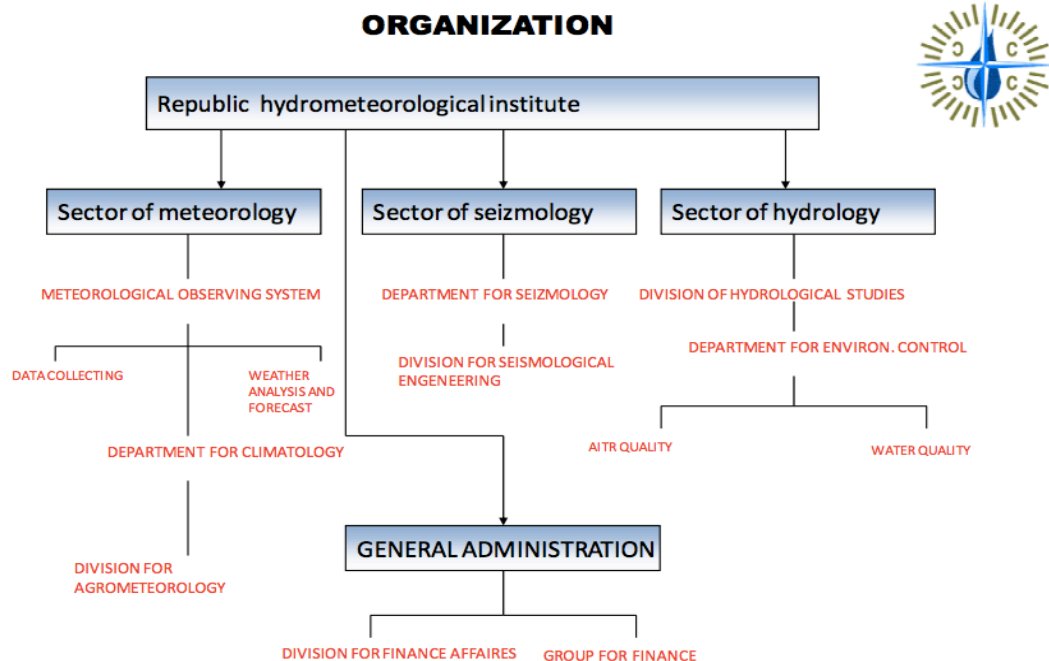
- Conducts regular monitoring of hydrological and meteorological data;
- Develops reports on the quantity, type and intensity of precipitation in areas affected by heavy rainfall;
- Makes projections on the e.g. intensity and rainfall, time;
- Provides regular updates and information of the river water levels in rivers to the Water agencies.

The Republic Hydro-Meteorological Service of the Republic of Srpska (RHMS RS) is located under the Ministry of Agriculture, Forestry and Water Management. Its roles and responsibilities are outlined in the relevant laws, which include among others:

- Monitoring hydrological, meteorological, seismological parameters as well as air quality;
- Creating, storing and managing databases with its collected data such as climatological databases;
- Researching the climate trends and conducting hydrology studies;
- Engaging in weather forecasting;
- Providing and publishing information for the public, including issuing warnings for extreme weather (hydro-meteorological) events.

An overview of the institutional structure of the organization is provided below in figure 4.

Figure 4 Organogram of RHMS RS



Source: WMO, 2012

RHMS RS is also engaged in natural hazards and other hazards risk assessments as it is part of an expert working group, which was established in March 2010 by the

government of Republic of Srpska ("Official Gazette of the Republic of Srpska" No. 22/10).

At present, the exchange of data and information as well as the coordination between FHMI, RHMS RS, the aviation weather services, the Water Agencies and other institutions that gather hydrological data is relatively limited. In addition, the Standard Operating procedures (SOP) and Quality Management Systems (QMS) between the hydro-meteorological services and the DRM sector have not been developed. Moreover, there is currently there is no hydrological forecasting methodology, model and operative system for floods established. Also, currently soil moisture is not measured, which would be highly beneficial for drought monitoring for agriculture.

Agriculture sectoral institutions

There are various institutions in BiH that support the agriculture sector. Although at the national or state level, a Ministry of Agriculture is lacking. Instead the Ministry of Foreign Trade and Economic Relations (MoFTER) at state level coordinates and harmonizes policies and plans established at the entity level. It supervises on several state level laws, including on e.g. veterinary services, plant protection, competition, consumer protection, cooperatives and on food safety.

In terms of its institutional structure related to agriculture, MoFTER established the Sector for Agriculture, Food, Forestry and Rural Development and has the following four departments:

- Department for international relations and project coordination;
- Department for policy analysis, monitoring, evaluation and information;
- Department for agriculture, food, rural development and policy coordination, and;
- Department for the coordination of payments system registries, inspection and advisory services.

In addition, the State Veterinary Office (SVO) of BiH as well as the Administration for Plant Health Protection (PHPA) are also part of MoFTER. These organisations directly report to the Minister of MoFTER, whereas the Sector for Agriculture, Food, Forestry and Rural Development coordinates them.

At the entity level, there is the Ministry of Agriculture, Forestry and Water Management of RS (MoAFWM) and the Ministry of Agriculture, Water Management and Forestry of FBiH (MoAWMF), which have a mandate on agriculture, veterinary, forestry and hunting as well as water management. The Entities have their own budgets and payment systems. Apart from MoAFWM RS and MoAWMF FBiH, there are other institutional agencies, which support the Ministries in policy implementation, such as the extension and selection service agencies, research institutes, inspection and municipality bodies. In the Federation, there are 10 cantons, which have their own agencies and organisations for agriculture, livestock, forestry and water management. At the municipality level, each municipality in the Entities has a Department of Agriculture and Water Management. In addition, there is the Department for Agriculture, Forestry and Water Management (DAFWM) in Brčko District. An overview of the institutional structure is provided in figure 5.

Figure 5 Key administrative bodies involved in agriculture administration in BiH

<p>STATE LEVEL: Ministry of Foreign Trade & Economic Relations – MoFTER Sector for Agriculture, Food, Forestry and Rural Development</p>
<p>ENTITY LEVEL: Ministry of Agriculture, Water Management & Forestry of the FB&H Ministry of Agriculture, Forestry & Water Management of the RS Department of Agriculture, Forestry & Water Management of District Brčko</p>
<p>CANTON LEVEL: 6 Ministries of Agriculture, Forestry & Water Management; 4 Agriculture Departments within Ministries of Economy</p>
<p>MUNICIPALITY LEVEL: Departments of Economy in 63 RS Municipalities Departments of Economy in 80 FB&H Municipalities</p>

Source: Foreign Investment Promotion Agency, 2013

Agriculture Extension Services

Due to the dissolution of the Socialist Republic of Yugoslavia in 1992 and the Bosnian War (1992–1995), the former system of trainings of agricultural producers was cancelled and a new structure of extension services was established in BiH through two EU funded projects. These projects, included the Private Farmers Assistance Project (PFAP), which was implemented from 1998 to 2000 and helped to set up extension service offices throughout the country. In the RS, this project established seven advisory services in the Banja Luka region with a central office in Banja Luka. During the second phase of this project (2000–2002), five regional centers were set up throughout the RS. In addition, a National Extension Services for BiH (EU-ESP) project was also implemented at the end of 1990s, which facilitated the set-up of the cantonal agricultural advisory services in FBiH. After the completion of these projects, the agricultural extension services continued to function as public extension services and the funding of which was covered by Entity or Cantonal level Ministries of Agriculture. The extension services are funded from the entity and canton or municipality budgets and all services provided by the public advisory systems in the country are free.

The agricultural extension services are structured at entity level. In the RS, there is the Agency for providing services in agriculture and after reorganization of the RS Ministry of Agriculture, Forestry and Water Management, this agency became part of the Ministry in 2013 as the Sector for Provision of Extension Services in Agriculture. This Sector has 78 employees that cover the whole of RS and besides the central office in Banja Luka, there are seven regional centers in Banja Luka, Prijedor, Gradiška, Doboj, Bijeljina, Sokolac and Trebinje.

There is the Cantonal Agricultural Extension Services in FBiH and the responsibility for the extension services are with the cantonal ministries that are responsible for agriculture. Whereas in Brčko District there is the Department of Extension Services and its Office of Agricultural Extension Services, which is located within the Department of Agriculture and Forestry is in charge.

If we consider that the transfer of knowledge in agriculture includes various systematically linked processes that include education, agricultural research, application of information technologies, continuous training of advisors and so on, it can be said that FBiH has fragments of this system in place. FBiH still has limited capacities that would

enable implementation of even the outdated approach to transfer of knowledge in agriculture, which is almost entirely based on agricultural extension services model of occasional trainings and visits to farmers. In addition, it can be said that generally extension services are more developed in RS than in the cantons, which require to set up and further developed.

The public extension services are primarily focused on production techniques as the majority of the staff are agronomists and agriculture engineers. Thereby focusing more on crop and livestock production than on plant protection, irrigation and the application of agricultural equipment as well as less attention is given to farm management, markets and marketing and so on.

There are also other agencies and organisations, like cooperatives, universities (agricultural faculties), research institutes including agricultural and veterinary as well as private actors that are providing advisory services. Although the communication and cooperation between these various actors regarding agricultural extension is considered relatively limited and not systematic.

The extension services in Bosnia and Herzegovina face various challenges related to finance, management and technical support. According to the MAFWM of RS, the main issues revolve around e.g. low number of extension staff, limited available financial resources, lack of information flows between the extension services and the Ministry of Agriculture as well as limited interest of farmers for training and a lack of specialised research institutes. Moreover, it seems that extension services are not involved in disaster risk management (Berjan et al., 2013).

Early warning systems

The two hydro-meteorological institutes in BiH are involved in the provision of early warnings for various extreme weather events. Although, regarding floods there does not exist a hydrological forecasting methodology, model and operative system.

Warnings

Warnings of hydro-meteorological hazards are developed by the FHMI, RHMS RS as well as the state level 112 system and provided to the public as outlined in Table 4. These warnings are based on the hydrological and meteorological observations as well as on numerical weather prediction models. At present, the hydrological and meteorological data of the 112 centre is publicly accessible through internet, however, it depends on the available services from FHMI and RHMS RS due to their lack of experts and expertise. Alerts are disseminated through the internet as well as SMS, phone, email, paper among others. FHMI shares its alerts to public media and state information organisations via SMS and internet, while RHMS RS develops bulletins three times a day and warnings up to 5 days in advance. In addition, the latter establishes special reports for floods, cold and warm waves, fires, thunderstorms and strong winds, which it disseminates to the Civil Protection Administration as well as the OC 112.

Table 4 Warnings issued in BiH for various natural hazards

Hazard	Exists in the country (y/n)	Warnings issued at entity level	
		Given by	Given by
Heavy precipitation	Yes	FHMI	RHMI
Flash floods	Yes		
River flooding	Yes		
Hail storm	Yes	FHMI	RHMI
Thunderstorm or lightning	Yes		
Heavy snow	Yes	FHMI	
Freezing rain	Yes		
Dense fog	Yes		
Tornado or cyclone	No		
Hard wind	Yes	FHMI	RHMI
Storm surge	Yes		
Coastal flooding	Yes		
Heatwave	Yes		
Cold wave	Yes		
Drought	Yes		
Marine hazard	Yes		
Sandstorm	No		
Landslide or mudslide	Yes		
Avalanche	Yes		
Airborne hazardous substance	Yes		
Waterborne hazards	Yes		
Forest or wildland fire	Yes		
Smoke, dust or haze	Yes		
Earthquakes	Yes		
Tsunamis	No		
Volcanic events	No		
Dispersion of insect pests	Yes		
Desert locust storm	No		

Source: WMO, 2012

In terms of media access and presence, FHMI does not have direct visibility on tv or radio, while, RHMS RS has direct access to a TV station with its logo and presenters and on the RS radio, although both hydro-meteorological organisations are not able to interfere tv or radio broadcasts in case of hazard warnings.

Forecasting

Weather forecasts for the public are only developed at entity level. At present, hydrological, flood or any environmental forecasts are not established as well as no 24/7 weather services are not provided in Bosnia and Herzegovina. An overview of the forecasting products developed by FHMI and RHMS RS are shown in Table 5 and 6.

Table 5 Forecasting products provided by FHMI

Type of forecast	Weather			Hydrological			Environmental		
	Provide	N/D	On web	Provide	N/D	On web	Provide	N/D	On web
Real time	No			No			No		
12 hours	No			No			No		
24 hours	Yes	3/d	Yes	No			No		
48 hours	Yes		Yes	No			No		
3-, 4-, 5-days	Yes	1/d	yes	No			No		
7-days	No			No			No		
10-days	No			No			No		
Monthly outlooks	No			No			No		
Seasonal outlooks	No			No			No		

Source: WMO, 2012

Table 6 Forecasting products provided by RHMI RS

Type of forecast	Weather			Hydrological			Environmental		
	Provide	N/D	On web	Provide	N/D	On web	Provide	N/D	On web
Real time	Yes	2/d	Yes	No			No		
12 hours	Yes	2/d	Yes	No			No		
24 hours	Yes	2/d	Yes	No			No		
48 hours	Yes	2/d	Yes	No			No		
3-, 4-, 5-days	Yes	1/d	yes	No			No		
7-days	No			No			No		
10-days	No			No			No		
Monthly outlooks	No			No			No		
Seasonal outlooks	No			No			no		

Source: WMO, 2012

With regard to agrometeorological forecasts, FHMI is involved in the analysis of drought agro-climatic indices as well as develops weekly agro-meteorological forecasts and alerts for the agriculture sector on seven day periods. This information is freely disseminated through agro-meteorological bulletins via internet and radio to the agricultural producers and the Ministries of Agriculture, Water Management and Forestry as well as scientific institutions and other relevant stakeholders. Although, FHMI does not receive any feedback from the users. The RHMS RS also develops specialised three to five days agro-meteorological forecasts for the agriculture sector.

Disaster risk assessments

According to the Law on Protection and Rescue, risk assessments in Bosnia and Herzegovina are conducted at the following three different levels:

- At the national level, where risk assessments are coordinated by the Ministry of Security BiH, Sector for Protection and Rescue;
- At the Entity level, where the Civil Protection Administrations coordinate the assessments;
- At the local level, where the assessments are coordinated by the local Authorities.

Before an assessment is undertaken, it is important to have access to pre-disaster baseline data as well as “historic data” of the risks for each particular disaster affecting each territorial unit. In order to build on the experiences and lessons learned on the occurrence of damages, the effects to crops, livestock and infrastructure, the impacts to the sector and the population and the response of the population and the government.

The overall responsibility for undertaking disaster risk assessment lies with the National Platform for DRR, however both, the Law on Crisis Management and the Law on Protection and Rescue are prescribing the obligation to conduct risk assessments. The Law on Crisis Management requires all hazard risk assessment to be conducted only for the local municipalities using a special methodology. Whereas the Law on Protection and Rescue requests the development of risk assessments for natural and technological hazards to be undertaken by all public and private institutions, including the local municipalities using a different methodology.

The basis of this national risk assessment is the Methodology for the Assessment of Risk from Natural and Other Hazards (“BiH Official Gazette” No. 86/09), which has been developed by the Sector for Protection and Rescue in collaboration with UNDP. It includes the identification of all hazards for the country, an assessment of the vulnerability of the people, property and critical infrastructure and the dimensioning of risk, likelihood, causes and consequences in terms of human, material and financial losses as well the existing capacities. A national risk assessment was conducted in 2009 by the Ministry of Security with assistance from various international organizations, such as the United Nations Development Programme (UNDP). Risk assessments have also been undertaken in the entities by Civil Protection and Rescue, but not in the cantons or municipalities. Within the agriculture sector, only a few risk assessments were conducted.

Generally, risk assessments seem to be mostly textual and there is little mapping. In addition, there does not seem to be a common standard when it comes to mapping of risks and hazards. For instance, within the Ministry of Agriculture, Water Management and Forestry in the Republic of Srpska, flood risk assessment is based on a methodology developed to assess and map risks, due to earthquakes, which uses a set of indicators that is not suitable for agriculture. At present, a methodology for flood risk assessment for agriculture is being developed in the RS as there is also no organized and standardized system of record keeping of impact data of previous disasters. At the municipal level, apart from some larger municipalities, little risk assessment and hazard mapping is being conducted. This is due to the limited capacity to conduct this and/or to interpret risk assessments and hazard maps from other organizations, such as from the water agencies and Protection and Rescue.

Flood risk assessment

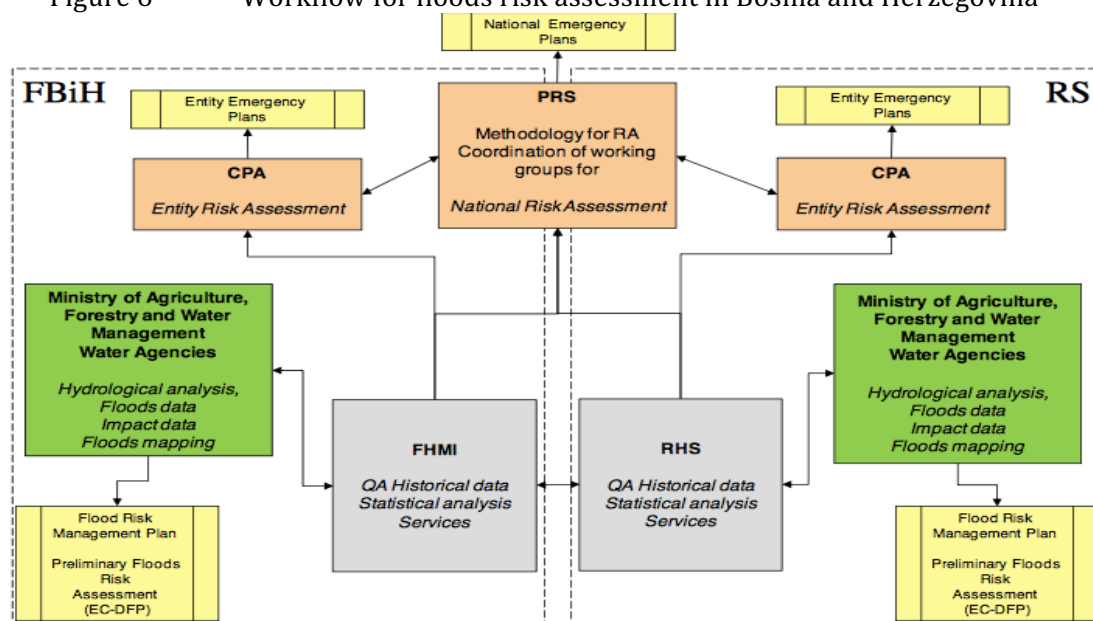
Figure 6 presents the workflows for flood risk assessment in Bosnia and Herzegovina and shows that at the entity level, the Ministry of Agriculture, Forestry and Water Management is the primary agency that is responsible for e.g. the administrative and technical obligations, the adoption of the annual flood protection plans and the organization of preparing the water balances at entity level for basic river basins.

In addition, the Water Agencies (WA), set up by the Ministry of Agriculture, Forestry and Water Management, are in charge of the implementation of the long-term, middle-term

and annual water sector development plans. These agencies are also tasked to collect information on the flood affected areas by developing flood maps and conduct initial flood risk assessments according to the EU Flood Directive. The information that the WAs give to local and entity authorities, hydroelectric companies, water users etc. helps to facilitate and enhance physical and environmental planning and thereby ensuring that the vulnerable flood-prone areas are not considered for the construction of houses and so on.

Both hydro-meteorological institutes in Bosnia and Herzegovina, however not shown in figure 6, are involved in risk assessments by providing analyses of the main hazards, including floods, primarily on the basis of data on e.g. the frequency, number of events and affected areas.

Figure 6 Workflow for floods risk assessment in Bosnia and Herzegovina



Source: WMO, 2012

Drought monitoring

Drought monitoring in Bosnia and Herzegovina is conducted by both hydro-meteorological institutes in the Federal Hydro-meteorological Institute in Sarajevo (FHMI) and the Republic of Srpska Hydrometeorological Institute in Banja Luka (RSHMI). These institutes are involved in activities, such as e.g. the systematic observation and monitoring of hydro-meteorological parameters; the provision and publication of information, forecasts, products and services related to weather, climate and water as well as the provision of data related to drought-relevant parameters, indices and indicators. At present, the FHMI and RSHMI have their own separate meteorological and hydrological measurements, with the objective to focus on the monitoring of their own entity only. Moreover, there is currently no early warning system for drought at the national level.

Despite that there are some activities that they are further engaged in, including e.g. the development of drought index calculation, treatment of data series, mapping, including the use of GIS tools and irrigation-scheduling software for drought analysis, Bosnia and Herzegovina still needs further capacity enhancement in these areas. For instance, more training in drought vulnerability assessment and remote sensing techniques for drought

monitoring management as well as the development of drought mitigation strategies, improvement in drought management planning and the establishment of a drought policy, in particular for the agriculture sector as it is highly impacted by droughts especially in the near future as a result of climate change.

Once the impact data is received from the risk assessments, for floods and droughts among others, the Protection and Rescue Sector and the Operational – Communication Center of BiH (OC 112), which is part of the Protection and Rescue Sector, consolidate this data that is received from the WAs and local authorities and use this data in the various relevant disaster impact reports. These documents are then used by the different national and international stakeholders.

Different planning documents are developed. At the entity, canton and municipality levels, there are inter-agency plans, which are believed not to be very functional and applicable only to a certain extent. The Protection and Rescue Sector is trying to create a single and unified methodology, in terms of the content, preparation method and approval of the planning documents at the state level. It is not clear whether this has been completed already, although it was envisioned to be finalized by the end of 2012 (WMO, 2012).

Post-disaster needs assessments

The following section will provide an insight into the current practices and existing methodological processes for conducting a Post-Disaster Needs Assessment (PDNA) in Bosnia and Herzegovina. Among the aspects that will be discussed include the current strengths as well as capacity gaps of the post-disaster assessment process as well as with regard to the development of the recovery needs and strategies.

The post-disaster assessment process in Bosnia and Herzegovina, especially for the agriculture sector, is currently a "bottom-up" process, which aims to collect data to appropriately inform the central government of the extent of the disaster impact on the people, their livelihoods and on the various sectors within society.

An example is the floods of 2014, where a Post Disaster Needs Assessment (PDNA) was conducted by the government with support from the European Union (EU), the United Nations (UN) and the World Bank (WB). The Government tasked the entity Ministries of Agriculture to manage the data collection and its analysis as well as to validate the costing of the damages and losses for the sector. Annex 1 provides an overview of the estimated costs of short-, medium- and long-term recovery and Disaster Risk Management (DRM) activities after the 2014 floods for BiH.

However, the PDNA process starts at the municipality level, where the assessment is initiated by the local governments (major) and include relevant local government staff per sector and other relevant local stakeholders. Local government staff is supported by relevant Ministry experts, which are responsible for collecting data and conducting assessments of the damages and losses in the affected agriculture sub-sectors, generally only crop and livestock.

The assessment considers the total affected agricultural land, the typology of crops and animals affected and the consequent production losses in financial terms. The final estimated cost of the damages and losses is sent to the entities Ministries and state government and eventually to the Ministry of Finance, which calculates the expected compensation. A clear methodology for the aggregation of the damages and losses from all the affected municipalities is, however, not available.

On the basis of the size and scale of the disaster, the government declares the emergency as a crisis at the regional or at the national level. When the disaster has impacted beyond the municipal boundaries, the so-called Regional Councils of the National Platform for DRR are established, which cover several geographically nearby municipalities. However, ultimately the decision of declaring an emergency situation is made by the Government, which also decides on the additional institutions to be involved and outlines the activities to be undertaken.

In terms of the validation of the data in order to ensure the integrity of the data collected as well as to ensure that no double-counting is occurring, this principle is performed in the Republic Srpska only, and it is conducted by the Extension Services staff, while in the FBiH there is a lack of technical capacity to verify the work of the local governments.

At the moment, there is only an outdated damage and losses assessment methodology that exists from the Socialist Federal Republic of Yugoslavia (SFRY), which is not in line with the existing international PDNA standards established by the EU, UNDG and the World Bank. Systems for data collection on damages and losses are quite ad hoc and can vary per location, so there is no uniform system of damage data collection. Compensation sometimes comes in the form of vouchers, while other times as direct payment and in the case of kick-starting agricultural production assistance usually comes in the form of seeds, fertilizers and other agricultural goods.

A PDNA not only assesses damage and losses, it also includes an estimation of the macroeconomic impacts of the disaster at national and provincial levels as well as obtaining an understanding of the socio-economic status and human development (including e.g the impact poverty, particularly rural poverty; the impact on household and personal incomes and loss of employment and incomes; impact on debts and access to finance; impact on food security), however these are not estimated nor taken into account during the compensation.

Moreover, a specific disaster recovery strategy is also not developed at the local, regional or national levels. As such any support provided to the affected population is based on the available funds which are distributed in accordance to ad hoc developed modalities. Therefore, follow-up recovery activities are mainly focused on the restoration of major infrastructural damages. There is a lack of vision and guiding principles for these activities, as they are not based on the estimated reconstruction and recovery needs, nor prioritised needs, response analysis or the formulation of interventions and estimated costs. In addition, the cross-cutting issues of gender and social equity and disaster risk reduction (1. Resilient Livelihoods and Building Back Better, 2. Strengthening disaster risk reduction and management, 3. Technologies and practices that build resilient livelihoods, 4. Preparedness) are not addressed in the recovery process.

Pre-Disaster Baseline

Overall, the State Statistical Office is a specialised and independent organisation within the state administration in BiH and it receives information from the entities statistical offices. The basic functions of this institution is the collection, processing and dissemination of statistical data regarding the current demographic, social and economic trends, which are based on the data provided by the entities statistical offices. The Entity statistical offices collect data on agricultural input and output and send them to the state statistical office on a monthly base. All available data is public and online available; for state level data, see www.bhas.ba, for FBiH level see www.fzs.ba and for the Republic of Srpska level see www.rzs.rs.ba.

Regarding a pre-disaster baseline in order to obtain the full extent of a disaster's impact, a baseline of the agriculture sector is not developed and therefore does not allow comparison of the changes between the pre-disaster and post-disaster situations. This baseline information should be compiled before the field assessment and should be validated as it serves as basis for the estimation of the post-disaster damages and losses for the disaster affected area(s). The tables used for the collection of the baseline data are also not prescribed.

Agriculture insurance

Almost all of the insurance companies that operate in Bosnia and Herzegovina offer agriculture insurance for various crops, fruits and animals. Different companies offer different types of packages, where a farmer could buy the 'basic' or 'premium' package etc., which would insure against different types of natural hazards. The largest insurance company that offers agriculture insurance is the Wiener Insurance group.⁵

It offers insurance for various types of crops, fruits, vine and forest planting material, perennial plants, ornamental plants, young trees up to 6 years old and so on. In addition, besides grains (seeds), also trunk (straw and cornstalks), may be separately insured as well as fruit and grape trunks and grapevines. It can be insured against fire and hail as well as floods, storms, spring and autumn frost and so on. Different animals can be insured, including domestic animal as well as wild and exotic animals.⁶ Other insurance companies include M Broker insurance⁷ and Triglav insurance⁸.

According to the annual reports from insurance companies, only 0.1 percent of farmers have insured their crops for a total amount of BAM 48 000 (approximately EUR 24 542⁹) in 2016 (Statistical Office of Bosnia and Herzegovina, 2016).

At present, there are no subsidies provided by the government to cover the costs of the premiums for the insurance of crops, animals etc., not from the entity level as well as not from the local authorities' level. And related to this, farmers are in general not ready to insure their crops, animals and so on, due to the very high costs and the many

⁵ For more information see <http://www.wiener.ba/bs/proizvodi-info/osiguranje-poljoprivrede/id/8>

⁶ For more information see <http://www.wiener.ba/en/products-info/agriculture-insurance/id/23>

⁷ For more information see <http://www.mbroker.ba/index.php/vrste-osiguranja/osiguranje-poljoprivrede>

⁸ For more information see <http://www.triglav.ba/osiguranja/kompanije/osiguranje-usjeva-i-plodova>

⁹ Calculated based on fixed exchange rate of 1BAM=EUR 0.511292

requirements set by the insurance companies. The insurance companies justify the high costs of insurance, due to the large risks and lack of protection measures in Bosnia and Herzegovina as farmers, for example, do not protect the fruit fields with anti-hail nets, or the lack of water supply or drainage systems to reduce the adverse impacts of floods and droughts on agriculture.

It seems that only during the last couple of years, when the frequency and severity of natural hazards has been increasing in BiH as well as the damage and losses it has caused to agriculture, that insurance for farmers is becoming more and more crucial.

For the future, it will be very good to have some awareness events for farmers and present them all facts, and of course all benefits they have from insurance, but from other side, state has to do some actions with insurance companies in order to decrease high costs of premiums, or even to subsidize insurance for farmers for beginning.

Conclusions and recommendations

Bosnia and Herzegovina is vulnerable to various natural hazards, such as floods, droughts, earthquakes, landslides, storms and wildfires. These natural hazards have significant adverse impacts on the agriculture sector through causing damage to agricultural facilities, equipment and material as well as losses in crops, livestock, forestry and fisheries.

The extensive impact of the recent floods, such as that of 2014 have raised awareness on the importance of disaster risk reduction. Bosnia and Herzegovina has adopted international DRR frameworks, including the Hyogo Framework for Action 2005–2015 as well as its successor the Sendai Framework for Disaster Risk Reduction 2015–2030. This shows the government's commitment and willingness to strive to reduce the country's disaster risks and enhance the resilience of communities to natural hazards.

At present, it is working towards shifting from a reactive emergency response towards a proactive disaster risk reduction approach. The country's DRR and sectoral legislation, however, has still limited focus on disaster prevention, mitigation and preparedness. Moreover, there is currently no national DRR plan, policy or strategy that guides the country towards the promotion of disaster risk reduction. Furthermore, there are several sectoral plans for the state as well as for the two entities and Brčko District, although the mainstreaming of DRR is highly limited. Efforts are undertaken to ensure that DRR will be integrated into the Strategy for Agriculture and Rural Development of Brčko District 2018–2023, which is currently being developed.

The institutional structure of the country for agriculture is complex due to the absence of a Ministry of Agriculture at state level. Instead various agricultural institutions are present at entity level, the Federation of Bosnia and Herzegovina, Republic of Srpska and the Brčko District. As a result, at entity, cantonal and municipal level there are variations in terms of the different DRR related components that are being implemented or not.

In order to enhance institutional coordination and collaboration among the various cross-sectoral organisation, as DRR is a cross-sectoral issue and should be dealt with as

such, it is recommended that establish DRR platforms at the various levels to facilitate this. Furthermore, the following recommendations for the various DRR components are outlined, which will enhance the existing institutional DRR system for the agriculture sector in Bosnia and Herzegovina,

Early warning systems:

- At present, the FHMI and RSHMI have their own separate meteorological and hydrological measurements, with the objective to focus on the monitoring of their own entity only;
- Establish an early warning system for drought at the national level;
- Enhance collaboration between FHMI and RSHMI and align their meteorological and hydrological measurements with the aim to conduct monitoring not only for their own entity only, also for the country as a whole;
- Develop a hydrological forecasting methodology, model and operative system for floods, which currently does not exist.

Post-Disaster Needs Assessment:

- Review the existing PDNA methodology and practices, including for damage and losses assessments, at the entity levels and Brcko District;
- Establish a roadmap for the establishment of the PDNA methodology, including practical forms for BiH, which are in line with the international standards established by the EU, UNDG and the World Bank;
- Improve and enhance the collection of pre-disaster base line data in order to make comparisons between pre-disaster and post-disaster data possible. This will help to better understand to what extent investments in DRR are paying off to reduce the costs required for recurrent disaster response and recovery in the near future.

Disaster risk assessments:

- Conduct risk assessments, not only in the entities by Civil Protection and Rescue, but also in the cantons or municipalities, which currently have not yet been undertaken, including conducting these assessments in particular for the agriculture sector;
- Enhance the mapping of risks and hazards and establish a common standard for this, especially develop a methodology, which uses indicators that are suitable for the agriculture sector;
- Improve and strengthen the capacity to conduct risk assessments and hazard mapping, including the interpretation of assessments and maps that municipalities receive from e.g. the water agencies and Protection and Rescue;
- Specifically enhance capacity building through the organisation of trainings in disaster risk assessment in general and drought vulnerability assessment and remote sensing techniques and software for drought monitoring in particular as well as the development of drought mitigation strategies, the improvement in drought management planning and the establishment of a drought policy, in particular for the agriculture sector. This will be highly important due to the increase in adverse impacts of drought events that are expected to occur as a result of climate change;
- Create a single and unified methodology to develop planning documents for the state, entity, canton and municipality levels, which should take into account a cross-sectoral perspective including the agriculture sector.

Agriculture insurance:

- Raising awareness among farmers of the different type of insurance products that are currently available to insure their crops and animals against various natural hazards;
- For the government to collaborate with the insurance companies and review if there is a possibility for premium costs to be lowered and/or some subsidies that could be provided to being able to partially cover the premium costs for farmers so that they can transfer their risk against crop losses due to impact of natural hazards.

Annex 1 Cost estimations of recovery and DRM interventions

Needs	Short term interventions		Mid-term interventions		Long term interventions	
	Short term interventions	Short term interventions Budget (EUR)	Mid-term interventions (12-24 months)	Mid-term interventions (12-24 months) Budget (EUR)	Long term interventions (+24 months)	Long term interventions (+24 months) Budget (EUR)
<ul style="list-style-type: none"> • Post disaster needs Assessment System, • Mechanisms for protection of National budget 	Increasing awareness for needs for establishment PDNA System and scanning the current country situation related to the disaster management	50 000	Establishing PDNA system in line with PDNA Strategy	1 500 000	Further development of PDNA system	300 000
	Developing National Strategy for PDNA	100 000	Developing a mechanism for protection of the National budget	250 000	Provide capacity building to national and local institutions on PDNA	50 000
	Developing mechanisms for catastrophe risk insurance	150 000	Provide capacity building to national and local institutions on PDNA	50 000		
	Improved access to emergency funds and /or developing contingent loans	1 500 000				
	TOTAL	1 800 000		1 800 000		350 000
	Total interventions in Disaster Risk Management	3 950 000				

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