



Food and Agriculture
Organization of the
United Nations

Comprehensive analysis of the disaster risk reduction and management system for agriculture in **Montenegro**

Enhancement of Disaster Risk Reduction and Management (DRRM) capacities and mainstreaming Climate Change Adaptation (CCA) practices into the Agricultural Sector in the Western Balkans (TCP/RER/3504)



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Food and Agriculture Organization of the United Nations
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Acronyms

DRR	Disaster Risk Reduction
DMC-SEE	Drought Management Centre for Southeastern Europe
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GVA	Gross Value Added
GIS	Geographic Information System
HFA	Hyogo Framework for Action
IPA	Instrument for Pre-Accession
LFA	Labour Force Survey
MARD	Ministry of Agriculture and Rural Development
MONSTAT	Statistical Office of Montenegro
NFI	National Forest Inventory
NSDS	National Sustainable Development Strategy
SDG	Sustainable Development Goal
DEC	Directorate for Emergency Situations
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United National Convention to Combat Desertification
WD	Water Directorate
ZHMS	Institute of Hydrometeorology and Seismology

1 Introduction

Montenegro is prone to various natural hazards, such as floods, droughts, storms, landslides, forest fires and so on. It is expected that with climate change, various types of extreme weather events will increase in frequency and severity, in particular floods, droughts, forest fires as well as the spread of plant and animal pests and diseases, which may adversely impact the agriculture sector in Montenegro.

Agriculture is highly vulnerable to the impacts of these natural and biological hazards, due to the climate sensitivity of the sector. Extreme weather events like floods, storms and droughts can lead to significant damage to agricultural infrastructure and facilities, such as irrigation systems, animal shelters, and food storages, that can completely destroy crops, affect livestock production and so on. As a result, disasters can significantly set back development and overall economic gains achieved over the years. Within this context, reducing disaster risk and helping people to build resilience to climate variability and change is crucial, in particular for those whose lives and livelihoods are dependent on the sector.

Montenegro has established a legal and institutional framework that is focused on disaster risk reduction. It is on its way to transition from an emergency response oriented approach towards a more proactive disaster risk reduction approach.

The aim of this report is to highlight the current strengths of the system as well as indicate existing gaps and capacity needs to further enhance it. This report provides recommendations to strengthen the existing institutional system to help reduce the adverse impacts of natural hazards on the agriculture sector in Montenegro.

This comprehensive review includes a general overview of the country's agricultural sector and outlines the most frequent natural hazards that are impacting the sector. It is followed by an analysis of the existing legal, policy and institutional structure and discusses various components of the system, including, the functioning of early warning systems, assessment of disaster risks, existing damages and losses assessments and the availability of agricultural insurance for farmers. Lastly, it concludes by providing recommendations for improving the current system.

This report is prepared for the project '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 (TCP/RER/3504)' and may lead to the implementation of certain capacity building interventions as recommended in this document.

2 Agriculture profile

2.1 General overview

The agricultural sector, including crop, livestock, forestry and fisheries, play an important role in the economy of Montenegro. The sector contributed approximately 8.1 percent to the country's Gross Domestic Product in 2015 (as presented in the table below). Despite being a development and economic priority, together with the tourism sector, according to official statistics, agriculture employs only 1.4 percent of all employed people in Montenegro (2015). However, according to the Labour Force Survey, the number employed in the sector is higher. The Agricultural Census 2010, states that 98 341 persons performed agricultural activities on family holdings.¹ Table 1 below provides an overview of agriculture relevant economic and labour statistics.

Table 1 Relevance of agriculture for the Montenegrin economy

	2010	2011	2012	2013	2014	2015
GVA of agriculture, forestry and fishing in current prices, (in thousand EUR)	239 947	263 564	237 098	270 164	280 086	294 597
Share of agriculture, forestry and fishing in GDP (%)	7.7	8.1	7.5	8.0	8.1	8.1
Employment in agriculture, forestry and fishing						
- Number of employees	2 224	2 292	2 505	2 771	2 686	2 552
- Share in total employment² (%)	1.4	1.4	1.5	1.6	1.5	1.4
- Number of employees³	12 900	10 900	11 400	9 100	12 300	17 100
- Share in total employment⁴ (%)	6.2	5.5	5.7	4.5	5.7	7.1
Trade with agricultural products						
- Export of agriculture products (in thousand EUR)	50 841	57 292	63 957	62 619	85 272	53 224
- Share in total export (%)	15.4	12.5	17.4	16.6	25.6	16.8
- Import of agriculture products (in thousand EUR)	397 692	429 259	435 437	442 758	461 155	446 732
- Share in total import (%)	23.8	23.5	23.6	24.9	25.8	24.3
- Trade balance of agriculture products (in thousand EUR)	-346 851	-337 196	-371 480	-380 139	-375 883	-393 508
Coverage of import by export (%)	12.8	13.3	14.7	14.1	18.4	11.9

Source: MONSTAT

In Montenegro, the production of fruits and vegetables is prevailing, while commercial production of field crops, such as small grains, corn, sugar beet, oilseeds, are limited. In particular, potatoes and vegetable crops are predominantly cultivated as well as fruit crops such as plums, apples, pears, peaches, and in the south even oranges, tangerines and figs. Recently, there has been an increasing

¹ MONSTAT, 2010

² Employment from administrative sources

³ Labour Force Survey, MONSTAT

⁴ Labour Force Survey, MONSTAT

production of grapes and wine. Table 2 outlines the most important cultivated crops in Montenegro, including the area size, output and location of production.

Table 2 An overview of the most important cultivated crops, 2015

Crop	Area planted (ha)	Output (t)	Geographical distribution
Apples	139.7	2 816.8	Central/North MNE
Plums	227.3	1 259.2	Central/North MNE
Mandarins	143.4	2 574.7	South MNE
Pears	35.0	365.5	Central/North MNE
Grapes	2,634.1	23 085.6	Central/South MNE
Potato	2,114.1	35 444.7	Central/North MNE
Peaches	92.5	1 491.9	Central/South MNE
Wheat	736.5	2 110.5	North MNE
Corn for grain	629.4	2 700.2	Central/North MNE
Olives	88.7	244.3	South MNE
Watermelons	482.7	20 194.2	Central/South MNE
Barley	370.1	952.0	North MNE
Cabbage	318.4	10 623.2	Central/South MNE
Oats	202.7	555.5	North MNE
Peppers	180.6	4 499.6	Entire MNE
Rye	178.2	338.8	North MNE
Onion	126.9	2 341.6	Entire MNE
Tomatoes	114.3	3 935.8	Entire MNE
Beans	100.5	855.5	Entire MNE
Melons	53.8	1 368.9	Central/South MNE
Cucumber	49.9	1 821.7	Entire MNE

Source: MONSTAT, 2015: <http://monstat.org/cg/page.php?id=1350&pageid=62>

Agriculture is the most important sector for those residing in the rural areas of Montenegro, in particular livestock breeding is an important agriculture subsector. Traditional and fragmented household holdings, extensive modes of production, inefficient operations and inadequate utilization of available natural resources characterize this subsector. Livestock breeding allows Montenegro to exploit less productive areas (pastures and meadows), which are predominant in the structure of total agricultural area in Montenegro (roughly 88 percent).

If the total area covered with pastures and meadows is divided by the total number of cattle and sheep/goats, it turns out that Montenegro has only 0.23 head of cattle and 0.46 head of sheep/goats per hectare. In the overall structure of households engaged in cattle breeding, only 2 percent of them are commercial entities, while the rest are family households. The average number of heads per household is low (3.3), and only about 40 percent of households have more than three cows or heifers. Ruminant breeding (bovine, ovine and caprine animals) is dominant, while pig and poultry breeding is less developed. The dominant breeds are those favourable for milk and meat production,

with the tendency of increasing dairy breeds. During the last few years, positive changes were recorded in the consolidation of holdings and the increase in the number of heads per holding.⁵

Foreign trade of agricultural products has steadily increased over the years. In 2015, the total exchange of agricultural products was € 499.9 million. Montenegro is a net importer of food. The coverage of exports by imports is low. In 2015, export-import ratio amounted 11.9 percent. The import value of agricultural products in 2015 amounted to € 446.7 million and had a share of 24.3 percent in total imports, while the exports value amounted to € 53.2 million and it participated in total exports with 16.8 percent.⁶

In terms of the products imported and exported products, no major changes were recorded over the years. The most important imported products are fresh meat, cereal-based products, various foodstuffs (including variety of sauces, spices, ice-cream, etc.), followed by carbonated (sparkling) soft drinks (beverages), milk and dairy products and live animals.

Regarding the exports, wine is still one of the main export products. In total export of agricultural products, wine participated with 29 percent in total value of export of agricultural products. The total value of wine exported in 2015 amounted to € 15.4 million.⁷ The wine sector is recognized as a very important sector for Montenegro. Besides wine, meat preparations, such as cured meat products, have become one of the country's main export products. The development of the meat industry in Montenegro has resulted in a significant change in both imports and exports, such as the growth of imports of fresh pork meat used as raw material, the decrease in imports of cured meat products due to higher consumption of domestic products and an increase in the export of these products.

2.2 Agricultural land

The surface of agricultural land in Montenegro covers 515 717 hectares, which is around 37.4 percent of the total Montenegrin territory. Of this area around 36 percent or 189 075 hectares is arable land, while two thirds of agricultural land is currently not cultivated.⁸ An overview of agricultural land according to different types of use is shown in Table 3 below.

Table 3 Agricultural land by categories of use (in ha)

Agricultural land by category of use	2012
Agricultural area (total)	515 717
Cultivable area	189 075
<i>a) Arable fields and gardens</i>	45 809
<i>b) Orchards</i>	12 028
<i>c) Vineyards</i>	4 512
<i>d) Meadows</i>	126 726
Pastures	323 998
Ponds and reeds	2 644

Source: MONSTAT, 2013

⁵ Government of Montenegro, 2015a.

⁶ MONSTAT, 2012.

⁷ Ibid.

⁸ Ibid.

Due to the surface and structure of the agricultural land, with 0.83 ha per capita of agricultural land and 0.31 ha per capita of arable land, Montenegro belongs to those countries with favourable land resources for agricultural development (2012).

Despite significant land resources, it has been divided among many family holdings. Thus, 31.6 percent of total agricultural land is comprised of parcels covering up to 0.5 ha. More than half of the holdings (54.1 percent) use 0.10 to 1.00 ha of agricultural land. 73 percent of family holdings have areas less than 2ha, while only 0.9 percent of family holdings have areas exceeding 100ha, they occupy 38 percent of used agricultural land.⁹

Family agricultural holdings and business entities have a total of 309,240 ha of available land, out of which 95.2 percent or 294,400 ha is owned by family holdings. Used agricultural land (including pastures) makes up 71.6 percent of the total agricultural land. Average agricultural holdings have 4.6 ha of used agricultural land.¹⁰ The large amount of uncultivated land is a consequence of the large share of pastures in the total agricultural land in Montenegro.

The best quality soil is located in river valleys, karst fields, and plateaus. Montenegrin relief is characterised by terrain slopes above 10° (65 percent), while slopes in-between 5-10° account for 28 percent. Only 7 percent of the territory has a slope of less than 5° thus enabling intensive use of land resources for agriculture and limited exposure to soil erosion.

In Montenegro various agro-ecological zones can be identified, with the following specific characteristics and conditions for the development of agriculture:

- The Coastal region, with 50 815 ha (9.8 percent of the total) of fertile agricultural land, which consists of deep alluvial - talus and brown anthropogenic land; This region is suitable for fruit and vegetable production as well as raising small ruminants. In addition, it is rich in terms of honey plants and herbs, and wild fruits, such as figs, pomegranate and so on.
- The Zeta-Bjelopavlici region with 78 997 ha (15.3 percent) is the lowland region of up to 200 m above sea level, suitable for different types of crop production, including vegetables, fruits and wine as well as cattle breeding.
- The Karst region covers 74 320 ha or 14.3 percent of the total, with an altitude of 700-800 m. Arable land is scarce and is found mainly in karst fields, hollows and valleys that dominate the waterless regions. The most important agricultural sectors are livestock, especially goats, sheep followed by cattle, and beekeeping.
- The North mountainous region with 184 528 ha at altitude above 800 m (35 percent of the total area) is characterized by numerous highlands and plateaus; suitable for growing grains, potatoes and cabbage, as well as for the development of livestock due to large areas of meadows and pastures.
- The Polimlje-Ibar region, which covers 25 percent of the total area or 129 804 ha is located at 1 000 m above sea level. Due to the fertile land and springs, this region is important for vegetable and fruit cultivation as well as cattle breeding.

⁹ Agricultural Census, MONSTAT 2010.

¹⁰ Ibid.

2.3 Forest

According to the 2010 National Forest Inventory (NFI), forests cover 59.5 percent of the territory of Montenegro (826 782 ha), while forestland covers the additional 9.9 percent (137 480). The total growing stock in Montenegrin forests is estimated at 133 million m³. In all forests in Montenegro, the total annual increment amounts to 3.2 million m³, while economic forests used for economic exploitation, such as the production of timber, reach 2.6 million m³.

The dominant species are beech, followed by spruce, fir, black pine and others. Most of the Montenegrin forests (78.7 percent) are mountain forests, situated at an altitude of 800 to 1800 m, on slopes with degrees of 6 to 35 degrees (87.2 percent).

Considering the criteria related to the elevation, climate and geology the territory is divided in five regions, namely the Eastern, Northern, Central, Karts and Coastal regions. The forests of the southern forest areas, which make up the forest on the coast and karst, have an unfavourable structure (sprout forests, bushes, shrubs and underbrush) and are generally included in the category of protective forests. The structure of forests in the northern forest area is much more favourable than in the southern areas, and it provides the best and most productive forest ecosystems that produce significant raw material resources.

About half of the forests in Montenegro are state owned, while the other half are privately owned. During the past decade, the share of private ownership has been increasing, due to the denationalization and lack of cultivation of private agricultural land, which were converted into forest areas. The quality of forests strongly depends on the type of ownership. Private forests are concentrated in the Karst and the Coastal regions, and are mainly young, poorly groomed or degraded.

The Forest Administration manages the state-owned forests with its headquarters in Pljevlja, while forests in the national parks are managed by the Public Company National Parks of Montenegro.

3 Natural hazards affecting the agriculture sector

Montenegro is prone to several natural hazards, including floods, drought, heavy rainfall or snowfall, windstorms, heat waves, landslides, avalanches and forest fires. Heavy rain is very common and often results in flash floods, landslides and rock falls, which can potentially damage the agricultural sector. The causes of soil erosion on forest and agricultural land, include general exposure of the terrain, as well as vertical stratification of vegetation and distinct steep slopes due to the often irrational and inadequate use of natural resources in these areas.

The most devastating impacts from natural hazards in Montenegro are caused by floods, which are primarily the result of heavy rainfall. However, a second contributing factor are the effects of human activities (e.g. uncontrolled and excessive exploitation of sand and gravel) in some river flows. Flooding in certain parts is periodical and manifests during the spring and autumn months. During the last 20 years Montenegro experienced six destructive floods of which the largest recorded in the

last decade occurred in 2000, 2010 and 2011.¹¹ Floods that occurred during the last few years inundated areas of land and settlements for a longer period, namely 15-20 days.

An assessment undertaken by FAO of the 2010 floods, estimated that around 30 000 hectares of agricultural land was flooded. The most affected was the area around the Zeta river valley and the area around Lake Skadar, specifically the territory of Golubovci, where most of the national vegetable production occurs. Total damages and losses were estimated at over € 13 million, of which over € 6 million in damages and over € 7 million in losses. Table 4 provides a detailed overview of the total agricultural damage and losses.¹²

Table 4 Agriculture damages and losses caused by the 2010 floods

Category	Total damages (€)	Total losses (€)	Total damages & losses (€)	Public (€)	Private (€)
Crop production	5 545 900	7 605 925	13 151 825	0	13 151 825
Seed and seedlings	211 534	0	211 534	0	211 534
Livestock	30 754	263 553	294 307	0	294 307
Land/irrigation/Drainage	250 000	0	250 000	250 000	0
TOTAL	6 038 188	7 869 478	13 907 666	250 000	13 657 666

Source: FAO, 2011.

River valleys that are prone to flooding occupy a relatively small area of Montenegro. However, these areas are of great importance, as they contain the largest settlements, agricultural areas for crop production and major roads. For instance, regarding floods, these are mostly linked to larger coastal rivers: Moraca, Lim, Tara, Cehotina, Ibar and Bojana, which affect these settlements as their banks are almost near all major cities of Montenegro. These rivers are threatening to inundate these areas at the time of high water. In addition, flooding periodically occurs as the water level of Skadar Lake increases due to the inflow of water from the Moraca and Drim, which threaten important agricultural areas around the lake. Depending on the duration of the flood, some wetlands are formed. The total flooded area amounts to 5 000 hectares, while 10 000 ha represent a marshy area.

According to the Second National Communication on Climate Change under the United Nations Framework Convention on Climate Change (UNFCCC) (2015), four dry years have been recorded in the last fifteen years, which has affected the Coastal region, Zeta Bjelopavlici region and the Northern region up to 1 000 m above sea level (2003), and in subsequent years covered all regions (2008), culminating with the ultimate extreme hydrological deficit in Zeta Bjelopavlići region (2011), where the largest agricultural area is located. Modern irrigation systems cover around 16 000 hectares of which only 2 310 hectares for vineyards and peach cultivation in Ćemovsko. As a result, the percentage of irrigation is almost negligible as it is only 1 percent of arable land.¹³ Frequent and intense drought adversely impact the quality of the yield, revenue, costs of plant culture due to diseases, insects and weeds, and the irrigation rate.

¹¹ Government of Montenegro, Ministry of Interior, 2014.

¹² FAO, 2011

¹³ Government of Montenegro, Ministry of Agriculture and Rural Development. 2015b

Data on monitoring drought and vulnerability maps can be found on the website of the Institute for Hydrometeorology and Seismology (HMS).¹⁴ The monitoring of drought has been temporarily stopped, as it is currently being improved in accordance with the implementation of the current European Union funded Instrument for Pre-Accession (IPA) project DriDanube - Drought Risk in the Danube Region, which aims to increase the capacity of the Danube region to manage drought related risks.¹⁵ Useful information for the Southeastern Europe region, including Montenegro, is also available on the web site of the Center for drought management in Southeast Europe (Drought Monitoring Center for South East Europe (DMCSEE)).¹⁶ ZHMS has made the archives with drought impact data from 2000 onwards, accessible to this Center. However, estimates of the damage and losses caused by droughts to the agricultural sector are not available.

Factors that threaten forest ecosystems are fires, pests, diseases and abiotic factors such as drought, floods, frost, snow and strong winds. The number of fires varies per year, but pose the greatest threat, in terms of environmental as well as economic damage, to forest ecosystems in Montenegro. Human activities, such as throwing away cigarette butts, glass, but also intentionally causing fire, are some of the causes of forest fires. This hazard affects around 1 percent of the total area of forests annually, while a record was reached in 2012 when fires affected 7 percent of the forest area. In the period between 2003-2012, Montenegro recorded about 767 forest fires, which damaged and/or destroyed approximately 18 850 hectares of forest and over 773.000 m³ of timber. It was estimated that during the period of 2007-2012, fires caused over € 6 million in damages to forests.¹⁷

Besides direct impacts, fires can also cause indirect damages that can result in the degradation of the environment, a reduction in the resistance of forests to pests and diseases and the destruction of authentic landscapes and soil structures. With the expected increase in the frequency and severity of droughts as a result of climate change, fire risk increases in the future especially to the southern forest areas, which are spread in the coastal and karst areas. There is risk of fire in these areas due to high air temperatures in summer and certain types of vegetation. In particular, during the months of July and August, when the amount of rainfall is very low as well as during the months of February and March in case of dry and warmer winters. Forest fires have become more intensive in recent years.

The Second National Communication on Climate Change (2015) states that, it is expected that temperatures may increase, which may lead to more frequent and longer heat waves, more hot days and nights, fewer days with frost and cold days and nights. In addition, less precipitation is expected, which may lead to more frequent droughts as well as an increase in the number of forest fires. It is expected that climate change will increase the frequency and severity of many types of extreme weather events, besides droughts, and forest fires, also floods and storms among others.¹⁸ Moreover, seasonal patterns may shift, which will lead to greater variability that may affect agriculture in Montenegro.

¹⁴<http://www.meteo.co.me/>

¹⁵ See <http://www.interreg-danube.eu/approved-projects/dridanube>

¹⁶<http://www.dmcsee.org/>

¹⁷ Ministry of Agriculture and Rural Development, 2014.

¹⁸ Ministry of Sustainable Development and Tourism, 2015.

4 Institutional structure of the DRR/M system for agriculture

4.1 Legal framework, policies and strategies supporting DRR in Montenegro

The following laws constitute the specific legal frameworks:

- The Law on protection and rescue (Official Gazette of Republic of Montenegro no 13/07,32/11 and 54/16);
- The Law on water (Official gazette. RM, no. 27/07 and 48/15);
- The Law on hydro meteorological services (Official gazette RM, no. 26/10);
- The Law on hydrographic services (Official gazette RM, no. 26/10).
- Law on Forests (Official gazette. RM, no. 74/10 and 47/15).

The Law on protection and rescue establishes the legal framework for the development and strengthening of national capacities to combat the harmful effects of natural and other disasters as well as to encourage regional and international cooperation with regard to prevention and mitigation activities. The law stipulates the rights and obligations of municipalities in the area of protection and rescue. It also includes the collection and consolidation of data on potential risk, the establishment of information and early warning systems and the implementation of preventative activities, such as risk assessments as well as the development of protection and rescue plans.

In accordance with the Law on Protection and Rescue, the Ministry of Interior has adopted the following two documents: i) "Ordinance on the content and methodology of development and harmonization, updating and storage of risk assessment studies", which form the basis for the establishment of the protection and rescue plans; and ii) the "Rulebook on the content and methodology of development, adjustments, updates and storage of protection and rescue plans."

The law stipulates that the Directorate of Emergency Situations at the Ministry of Interior proposes and the Government adopts national protection and rescue plans. These planning documents help to provide a systematic approach to the state administration bodies and bodies of local self-government, as well as for companies, other legal entities and entrepreneurs with regard to the preparation, organisation and implementation, including required resources, of the protection and rescue activities and measures for people, material and cultural goods and the environment.

The Law on water mentions the obligation to prepare a general plan for the protection from harmful effects of water. The current plan expired as it covers the period 2010-2016. It contains: works and measures which are undertaken preventively and in the period of high waters for protection from floods and erosion; method of institutional organization of protection; duties and responsibilities of the manager for protection; method for monitoring and recording data; method for early warning.

The law foresees the preparation also of an annual operational plan for the protection of the harmful effects of water. At national level, the Directorate for Water and the Ministry of Agriculture and Rural Development should prepare it, while at local level it should be prepared by a competent local authority, with the approval from the Ministry. The Operational Plans determine the names of managers of protection against the harmful effects of water, headquarters, bodies and names of

companies and other entities that conduct legal protection against the harmful effects of water and means for operational implementation of protection.

Protection from harmful effects of water in Montenegro is organized and conducted by the Ministry of Agriculture and Rural Development and Water Administration in cooperation with the Directorate for Emergency Situations of the Ministry of Interior, the Institute of Hydrometeorology and Seismology, the Agency for Environmental Protection and companies or other legal entities entrusted with, or in charge of maintaining the facilities for protection against harmful effects of water.

Protection from harmful effects of water is of high importance to Montenegro and is managed by the headquarters for protection against harmful effects of water, headed by Deputy Minister of Agriculture and Rural Development - Department of Water Management. Reports on the hydrological situation, warnings and forecasts produced by the Institute of Hydrometeorology and Seismology are communicated to the Head of department for protection from harmful effects of water.

The Law also defines the manner and conditions of water use for irrigation of agricultural land. The Law prescribes protection against harmful effects of water that includes works and measures on flood protection, protection of river erosion, protect against erosion by water, wind and torrents, and drainage and elimination of consequences of these effects of water. In order to prevent and eliminate harmful effects of erosion and floods, a number of actions are implemented: special preventive measures, construction and maintenance of protective structures and protection works. Protective work shall include: construction and maintenance of flood control structures (dams, biotechnical objects, etc.) and performance of protection works (forestation, grassing, terracing etc). Erosion and flood protection is implemented by local governments, as well as owners and users of land in erosion areas. The rehabilitation of the consequences of harmful effects of water to wetlands, water bodies and water facilities shall be based on the program of rehabilitation which determines the type and scope of works required.

The overall protection plan provides that in case a major flood hazards (declaration of the fourth degree of danger of flooding), the management of protection and rescue of people, material and cultural goods is to be ensured by a Coordination Team for protection and rescue. In this case, further action regarding the protection and rescue operations are undertaken regulated by the National Plan for the Protection and Rescue of Flood, prepared by the Ministry of Internal Affairs and Public Administration, in accordance with the Law on Protection and Rescue. Ministry of Interior, through the Department for Emergency situation coordinates the work of all segments of the system of protection and rescue, which are: Ministries, Police Directorate, other state bodies, Montenegrin Military, economic society, operative units for protection and rescue, Agency for environmental protection, Institute of Hydrometeorology and Seismology and Center for Eco-toxicological Researches.

The laws on “Hydro meteorological services” and on “hydrographic services” define the tasks of the Institute for Hydrometeorology and Seismology of Montenegro of Montenegro (ZHMS). It states that the ZHMS has a responsibility to produce non-scheduled meteorological and hydrological information and warnings in situation before atmospheric and hydrosphere elementary disaster (emergency situation); organize emergency observation and measurement of the hydrological

stations profiles and emergency information shall be submitted; monitor weather and waters; collect and analyse data; prepare forecast; inform and alert responsible agencies as the Institute for Hydrometeorology and Seismology of Montenegro issues information on status and weather forecasting, climate and water in the form of text, in writing, in the form of tables, charts and graphs through networks of electronic or postal traffic, or in the print and electronic media in the form of regular press releases.

Law on Forests stipulates the protection, preservation and enhancement of forests, planning, methods and conditions of using the forest, construction and maintenance of forest roads, forest monitoring, as well as other issues of importance to the forests. The Law stipulates that the competent administrative authority (Forestry Directorate), in the period of increased risk of fire in the forest and forest land, is obliged to ensure forest preservation activities by establishing permanent off-hours. In addition, for the forests and forestlands that are exposed to increased risk of fire, the specific measures are applied to prevent and prepare for fire-fighting. The Law stipulates an obligation for owners and users of forests to prevent, suppress and participate in extinguishing fires in their forests, or forests that they use. For degraded forests caused by forest fires, the Ministry of Agriculture and Rural Development shall adopt the Forest Restoration Plan. The law stipulates that the planning, design, construction and maintenance of forest infrastructure can only be made in accordance with the principles of nature, in a way that does not endanger water sources and water flows, not causing erosion, damaging forest ecosystems, threatening the habitats of rare and protected plants and animal species, prevents the normal flow of water from the flood; destabilizes the soil and increases the risk of landslides and endangers the multi-beneficial functions of forests.

The National Strategy for Emergency Situations is adopted by the Government of Montenegro in December 2006 and aims to establish national treatment of all types of accidents and organized actions of government and other institutions for effective response in case of different types of natural, technological and other disasters. This strategy, which covers natural, technological and biological hazards, was established through the involvement of various stakeholders, including the Ministry of Agriculture, in particular the veterinary services.

It provides a sound basis for the setting up and improvement of the disaster risk management system and recognizes the importance of the inclusion of disaster risk reduction in highly vulnerable areas as well as for vulnerable social groups. The National Strategy analyzes all risks that Montenegro is exposed to; it includes the readiness of Montenegrin organizations in the case of various types of hazards and outlines the institutional framework for the protection from natural, technological and other disasters.

The Committee for DRR was established in 2014 and has organized three National Platform for DRR conferences so far, with involvement of two representatives of the Ministry of Agriculture and Rural Development, in charge for water management and forestry. The importance of constant monitoring of the hazards and the need for an integrated approach to disaster risk reduction is emphasized.

Various DRR measures mentioned, among others, are enhancing community preparedness and awareness raising, developing GIS programmes for automatic hazard monitoring. Specific DRR measures for agriculture include primarily those related to the livestock subsector, such as the

expansion, strengthening and modernization programme of animal health protection according to EU requirements, introduction of a system of identification and registration of all types of animal movement, enhancement of preparedness for response through awareness raising and the provision of education and trainings on animal pests and diseases among veterinary staff at all levels. Overall, it seems that the proposed measures and activities are still rather reactive than proactive DRR with primarily attention given to humans and less to agricultural assets or relevant properties.

The National Strategy for Climate Change until 2030 adopted in 2015 mentions natural hazards, such as floods and landslides; however, no connection is made between these hazards and climate change. Although various climate change adaptation measures, which are relevant for the agriculture sector are included e.g.:

- Adjustment of the date of sowing and planting;
- Crop relocation;
- Improved land management, like erosion control and soil protection by planting trees; - construction of protective walls and barriers to mitigate impacts from storms;
- Land acquisition and creation of wetlands to mitigate rising sea levels and flooding.

Due to the expected impacts of climate change on the agriculture sector, a list of recommended measures for different sectors were outlined, including the need to e.g.:

- Conduct scientific research on CC impacts on agriculture and different crops;
- Usage of varieties or hybrids, which have different maturity periods;
- Development of irrigation and drainage systems to regulate the content of water in the root zone;
- Implement reduced tillage, deep tillage, crop residues covering the surface of the soil, changing the density of sowing or planting in order to preserve a certain amount of moisture in the root zone system;
- Prevention and control measures against pests and insects;
- Changing the use of fertilizers, in terms of quantity and timing when applied;
- Establish more flexible agricultural system to reduce the effects of climate change.
- Develop national policy for drought management as well as a set of measures for e.g. the livestock and forestry sector.

Only the UNFCCC, as an international framework, is mentioned a few times throughout the document, with the primary focus on anthropogenic impacts while Ministry of Agriculture is considered as a relevant body mostly for water management and forestry.

Apart from the above-mentioned strategies, which represent the main national disaster risk reduction and climate change strategies, the following national planning instruments include to a varying extent the mainstreaming of DRR into these sectorial strategies:

The aim of the **Strategy for the Development of Agriculture and Rural Areas for the period 2015-2020** is to establish a framework as well as define targets, priorities and sustainable development of its agriculture and rural areas. The strategy is primarily developed within the context of the transposition, implementation and enforcement of the *acquis* – EU accession policy.

One of the main objectives of the strategy is the *“long-term management agricultural resources in a sustainable way, along with the preservation of the environment, natural resources and biodiversity”*. However, it is not mentioned how the environment, landscapes or ecosystems will be preserved. Instead long-term goals for Montenegrin agriculture are to increase productivity and the amount of cultivated land as well as to align with EU standards for food safety in both the relevant primary and processing sectors.

An increase in the frequency of droughts, erosion and heavy rainfall are mentioned as a result of climate change. The strategy mentions that the majority of this impact will be felt by the agriculture sector, in particular through the usage and availability of water, as annual available water quantities for the sector are expected to decline in many areas due to a decrease in summer rainfall, especially in Southern Europe. However, DRR measures to address these expected impacts are not mentioned. In general, natural hazards and the increasing vulnerability or expected impacts of climate change on the sector are not included in the section of the sector’s constraints and challenges.

The only relevant DRR measures for the agriculture sector is the implementation of animal health protection measures to prevent and control the outbreak and spread of animal pests and diseases. Other related DRR measures which help to create healthy ecosystems to better withstand external shocks and stresses from for instance natural hazards, such as the adoption of sustainable resource management, sustainable use of mountain pastures and the development of organic agriculture. In addition, some DRR measures are also included in the 2013 Code of Good Agricultural Practice, such as those related to soil erosion and animal health.¹⁹

Reference is made to international relevant frameworks, such as the UNFCCC as well as the United National Convention to Combat Desertification (UNCCD), however, Sendai Framework for Disaster Risk Reduction, the successor of the Hyogo Framework for Action (HFA) are not included in the document. In addition, financial resources are not allocated for DRR. The primary support provided by the agro budget is the *“financing of measures aimed at ensuring the income of agricultural producers through direct support measures....which will improve quality of products, increase productivity, create better living conditions in rural areas and create new jobs”*.

Strategy with the Development Plan of Forests and Forestry for the period 2014-2023 - National Forestry Strategy provides an overview of the forestry situation in Montenegro. Forest fires are mentioned as a threat caused by climate change, including the expected adverse impacts of climate change on certain forest species. During the period of 2005-2010, it was estimated that on average 1 percent of the forests were damaged by fire. In 2012 this figure exceeded 7 percent.

DRR is not systematically mainstreamed throughout the strategy, however, it does prescribe several measures to reduce forest fire risks, such as improving institutional capacities to prevent and mitigate forest fires, afforestation, establishing and maintaining open areas within the forest, increasing investments in fire fighting equipment, infrastructure and training, establishing a system of rapid reporting of fires through the usage of infrared video cameras and so on.

¹⁹ Ministry of Agriculture and Rural Development, 2013b.

In terms of institutional and cross-sectorial cooperation and collaboration it is stated that no adequate information system is in place within the Forestry Directorate, which is prerequisite for proper communication among the stakeholders as well as for cross-sectorial coordination. According to the strategy, financial resources for forest fire prevention and management until 2023 will be provided by the Ministry of Agriculture that is responsible for the forests and the IPARD funds.

Furthermore, the strategy also places emphasis on the role of the Montenegrin forests within the context of climate change mitigation. It is estimated that the forests of Montenegro accumulate approximately 4.6 million tonnes of CO₂ annually, which is nearly the entire annual 2003 greenhouse gas emissions of the country, that amounted to 5.3 million tonnes of CO₂ equivalent. As a result, these ecosystems play an important mitigation role.

The Fisheries Strategy and Action Plan of Montenegro 2015-2020 is prepared as a map for EU integration and the negotiation process. It identifies key steps that Montenegro intends to take to prepare for the complete fulfillment of its obligations arising from the Common Fisheries Policy. These strategic guidelines for the development of fisheries are focused on the conservation of biodiversity and sustainability of fishing activities. Montenegro will continue to fund measures that focus on the modernization of the fishing fleet, including the modernization of its existing farms for both - mariculture and freshwater aquaculture, to increase production as well as the strengthen its competitiveness and efficiency of the sector, while respecting high standards regarding protecting animal health and welfare as well as the environment. DRR nor climate change or any adaptation measures are mentioned in this document.

Water Management Strategy for the period 2016-2035 includes an evaluation of the current situation in the area of water management, goals and objectives, guidelines for water management, measures to be implemented and development projections for sustainable water resources and management. Floods as a natural hazard are included in the rationale of the strategy, also the importance of risk assessment as part of the management of flood risks and flood control measures are mentioned. Floods are primarily viewed within the context of climate change and its impacts on water flows, surface and groundwater for the water supply for settlements.

The strategy includes various goals to reduce the risks of floods and the adverse impacts of this hazard. In addition, the main impacts of climate change are recognized, among others, the expected increase in air temperatures, the lengthening of the dry season, uneven rainfall patterns, the occasional multi-day record-breaking storms and heavy rainfall during the dry period. Several measures are mentioned, such as effective and coordinated action for flood protection, efficient and continuous monitoring and forecasting of floods, regular maintenance and control of watercourses, drainage, anti-erosion protection and soil conservation and so on.

The strategy does outline for each measure the institutions that should be involved for its implementation, such as the Ministry of Agriculture and Rural Development – Directorate for Water Management and Water Administration, Ministry of Interior – Directorate for Emergency Situations, Institute for Hydrometeorology and Seismology and local governments, including coordination between national and local levels.

The action plan for 2016-2020 includes the division of financial resources planned for various activities, such as € 345 million for the protection from water, of which € 120 million for flood protection, € 200 million for the protection against erosion and € 25 million for drainage.

National Sustainable Development Strategy (NSDS) until 2030, adopted in July 2016, is an umbrella strategy that outlines the trends in terms of sustainable development. The issue of the preservation of natural capital through the halting of degradation as well as the value of renewable natural resources (biodiversity, water, air, soil) is specifically elaborated as well as the mitigation of the adverse impacts of natural and anthropogenic hazards.

DRR is quite systematically mainstreamed throughout the document as it is integrated into a strategic goal, namely as follows:

*'Strengthening the resilience, reduce vulnerability and exposure to natural and anthropogenic hazards', which is envisioned to be achieved through "improving the understanding of risks; strengthening the institutional framework of risk management; investing in risk reduction and strengthening the resilience of natural and social systems; improving preparedness for disaster response and reconstruction through recovery, rehabilitation and reconstruction."*²⁰

DRR is mentioned as a self-standing outcome and as an output, with a particular set of envisioned measures and activities that are also linked to the Sustainable Development Goals (SDGs). The Sendai Framework for DRR is also mentioned in the strategy. However, the agricultural sector is not integrated and as a result no direct relation is made between DRR and agriculture.

NSDS is prepared by the Ministry of Sustainable Development and Tourism, while it is being monitored by the National Council for Sustainable Development and Climate Change. This Council is chaired by the President of Montenegro and the members are almost all ministries and bodies relevant for DRR. The NSDS is a so-called roof strategy, which means that all other strategies should be in line with it and in this way linkages are established between climate change and disaster risk reduction. However, potential financial internal and external sources for DRR were not identified.

4.2 Institutional framework

The institutions that are responsible for the management and implementation of different components of DRR are:

- Directorate for Emergency Situations under the Ministry of Interior;
- Institute for Hydrometeorology and Seismology of Montenegro (ZHMS), under the Ministry of Sustainable Development and Tourism;
- Ministry of Rural Development and Agriculture;
- Directorate for Water, under the Ministry of Rural development and Agriculture;
- Forestry Directorate, under the Ministry of Rural development and Agriculture;
- Local Authorities – Secretariats involved in water management.

²⁰ Ministry of Sustainable Development and Tourism, 2016: 134-135.

The Directorate for Emergency Situations represents an organizational unit within the Ministry of Interior. According to the Law on Protection and Rescue, the Directorate for Emergency Situations coordinates the work of participants in the protection and rescue system with respect to the organization, planning, preparation and implementation of measures and activities to reduce various disaster risks. In addition, another responsibility of the Directorate for Emergency Situations is to assess risk and prepare national protection and rescue plans.

The Directorate for Emergency Situations employs 129 staff. In all municipalities in Montenegro, the protection and rescue services have been established, which includes a total of 597 members, except in the newly established municipalities of Petnjica and Gusinje.²¹ The radio communication system still does not meet the criteria for the operation of professional services and some are not functioning at all. In addition, the existing personal and collective equipment of members of the services is not fully in line with standards prescribed by the EU.

The National Platform for DRR is a permanent forum for exchange of views, opinions and suggestions that contribute to disaster risk reduction across all sectors. Members of the committee are representatives of the Ministry of Interior, Ministry of Defence, Ministry of Agriculture and Rural Development, Ministry of Sustainable Development and Tourism, Ministry of Health, Ministry of Science, Institute of Hydrometeorology and Seismology, Institute for Emergency Medical Services, Institute of Public Health, Red Cross of Montenegro, Agency for environmental protection and Center for eco-toxicological tests. In addition, representatives of the state bodies and institutions, universities, companies, NGOs and other entities involved in the disaster risk reduction may participate.

The **Institute for Hydrometeorology and Seismology of Montenegro (ZHMS)** is the main actor related to hydrological, meteorological, environmental and marine observations, monitoring and services. The Hydro-Meteorological Institute of Montenegro is located under the Ministry of Tourism and Sustainable Development. According to the law on Hydro-meteorological activity, ZHMS has the mandate to monitor weather and waters; collect and analyse hydro-meteorological data and data on water and air quality; prepare forecasts and inform and alert responsible agencies.

It is responsible for tasks related to the observation, measurement and analysis of meteorological, hydrological, hydrographical, environmental and agro-meteorological parameters. Moreover, it is involved in forecasting and presentation of data in the area of meteorology, hydrology, hydrography, environment and agro-meteorology, establishment of information systems thereby taking into account climate, hydrological, hydrographic, environmental and agro-meteorological research.

Data is collected through meteorological, hydrological and agro-meteorological measurements, which monitor weather, water, and air, and that are maintained by ZHMS. In addition, it produces non-scheduled meteorological and hydrological information and warnings in the event of a hydro-meteorological disaster.

²¹ Ministry of Internal Affairs, 2015d.

Furthermore, the role of ZHMS is to provide basic statistics and analyses of extremes and climate variability to be used for strategic planning of DRR. ZHMS provides this information to the Directorate for Emergency Situations and also to the Water Directorate. Flood risk assessment and analysis are still not implemented by ZHMS, while the drought risk assessment and analysis is actually supported within the projects of the Drought Management Centre for Southeastern Europe (DMC-SEE). ZHMS is also included in the national team for risk assessment formed at the state level and coordinated by Directorate for Emergency Situations ²².

The **Ministry of Agriculture and Rural Development (MARD)** is in charge of water management. The Ministry is mandated to prepare the General Plan for protection from harmful effects of water every 6 years and the yearly Operational Plan. MARD is currently not involved in any activity aiming to analyse drought or to assess drought impacts on the agriculture sector in Montenegro. The approach of MARD is mainly focused on the providing conditions for construction of irrigation system as a way to reduce drought risk.

The Ministry is also in charge of forest management. It has a mandate to prepare the National Forest Policy, the Strategy for Forestry Development and the Forest Development Plan that shall be adopted for the period of 10 years. The roles and responsibilities of the Forestry Directorate are further elaborated below.

Within the Ministry, the **Water Directorate (WD)** is an organizational body dealing with Water Management. Water Directorate is responsible for the planning and implementation of protection measures and infrastructure. WD is charged to prepare water management plans for each river basin on the basis of flood risk assessment. According to the law on water, the Water Directorate is responsible for the implementation of the European Union Water Framework Directive (WFD) and the Floods Directive. The technical capacity and human resources of the Directorate are insufficient. The Directorate activities are carried out principally on project basis using external resources.

The implementation of the Water Framework Directive 2000/60/30 is currently on-going. The following four obligations, including the identification of water areas, the appointment of competent authorities, the effectiveness of the administrative arrangements for international rivers, lakes and coastal waters, and an economic analysis of water use, have been implemented. Montenegro implements the annual monitoring programmes of water, but they have not yet been harmonized with EU standards, given that the programmes do not contain the parameters and water classification schemes prescribed in Annex V of this directive. Montenegro intends to adopt plans for river basin management in accordance with the Water Framework Directive by 2020. Within six months after their adoption, the creation of a programme of measures is planned for each river basin. During the screening process, 2030 was mentioned as the deadline for full implementation, however, this date may later change.²³

The implementation of the Floods Directive 2007/60/EC is at an early stage and the date of the full implementation has not yet been determined. Montenegro adopted a master plan for water (2010),

²² WMO, 2012.

²³ Screening report Montenegro Chapter 27 – Environment

which covers a period of 6 years. The preliminary flood risk assessment is prescribed by the Water Management Plan of Montenegro. Through the Law on Financing of Water Management Montenegrin representatives are intended to coordinate the preparation of the flood risk management plans for river basin management required by the Water Framework Directive. The Ministry of Agriculture and Rural Development, the Institute for Hydrometeorology and Seismology of Montenegro and the Ministry of Interior were identified as competent authorities and share responsibility together with local authorities for the implementation of this Directive. The deadline for the preparation of flood risk management plans is 2021, while the deadline for full implementation, which includes structural measures of financial needs (about € 120 million), is not defined.

The **Forestry Directorate**, as a body within the Ministry of Agriculture and Rural Development, adopts a forest management programme for each management unit. It performs administrative tasks and implements activities related to e.g. ensuring and improving the state of forests and forest management; restoration, protection of forests and forest lands; monitoring of implemented measures in forest management; performing professional supervision and quality control; and keeping records and a forestry database/information system.

Until now, the Forestry Directorate still does not perform all functions in the manner envisaged by the Law on Forests and according to the requirements defined by European legislation. This is due to among others, limited capacity for forest management with regard to its advisory service role, participatory planning, development of projects and involvement in international projects and networks, the management of Nature 2000 areas, establishment of forestry information system, establishment of units to design and supervise the construction of forest roads.

There are plans to establish entrepreneurial units in each regional unit of the Forestry Directorate, who will be trained and equipped to fight fires and who will be mobilized in case of forest fires. According to the Plan, these people should include staff from the Forestry Directorate, concessionaires and other companies. The Forestry Directorate will manage these units. The existing equipment and material for fire protection are significantly out of date, such as vehicles for the transport of the team, off-road extinguishers, fire-fighting equipment and equipment for members.

Plans for development of forests and forest management programmes should include measures to adapt to climate change in terms of increasing the resistance of forest ecosystems and their protection from forest fires and other threats that are endangering forests. One of the preventive measures, which are currently not yet implemented, is the maintenance of existing open spaces in the forest areas to reduce the risk of forest fires.

Disaster risk assessments

Risk assessment at the national level is conducted by the Ministry of Interior in cooperation with the ministries and other government authorities, and if needed risk experts from scientific and professional institutions can also be engaged. While the municipal assessment are undertaken by the municipality, with the involvement of different type of risk experts from scientific and professional institutions if required.

Risk assessment aims to analyze, evaluate and summarize all information related to, e.g.:

- The causes that can lead to the occurrence of a natural, technical-technological accidents and disasters;
- The degree of risk to people, animals, plants, material goods and the environment;
- The consequences that may arise to humans, animals, plants, material goods and the environment.

The Directorate for Emergency Situations under the Ministry of Interior is thus responsible for risk assessments. The process of risk assessment for drought and floods is performed by the Department for Risk Management. It is also responsible for the management of the national database of the risks as reported by the National Strategy for Emergency Situations. The duties of the Department encompass the drafting and development of strategic documents and plans at national levels, cooperation with scientific bodies (universities), laboratories and other research institutions.

As indicated in the National Strategy for Emergency Situations, line ministries and relevant agencies, are involved in the preparation of specific plans, participating in the ad-hoc working groups and are responsible for providing specific data and analysis to the Department of Risk Assessment. The Directorate for Emergency Situations relies on the operational units for protection and rescue, which include among others, civil defense units, municipal services for protection and rescue, specialist units, volunteer units, entrepreneurial units and units for fire-fighting.

In terms of hazard mapping, which is one of the requirements of the EU Water Framework Directive, the Ministry of Agriculture and Rural Development should e.g. ensure the identification of flood risk areas, development of flood maps and integration into physical planning as well as development of a Water Information System. Furthermore, the Ministry is in charge of the design, construction and routine maintenance of flood protection facilities. However, its technical capacity is quite limited and as a result technical work is often undertaken by external service providers through projects.

Early warning systems

Well-functioning early warning systems are extremely important for the agriculture sector as timely and accurate alerts can help mitigate the adverse impacts of natural hazards on the sector. However, it is not only important that alerts are disseminated through various media, but these warnings also have to be adequately received and understood so that the community is aware and knows what to do so that the loss of lives and livelihoods can be reduced. As a result, enhancing community-based planning and preparedness is essential, and can be achieved through measures such as, establishing community multi-hazard and vulnerability maps and community action plans via participatory tools and approaches.

Technical capacities of hydro-meteorological services to support DRR are not in line with the requirements and are characterized by the following shortcomings:

Monitoring and observations networks and data exchange

- The meteorological and hydrological observations are the base for climatological studies, but ZHMS has no own calibration facilities for meteorological sensors. Although, this disadvantage has been resolved within the inter-regional cooperation of the National

Hydrometeorological Services, which has resulted in accurate and reliable measurements. Additionally, numerous activities within the instrument calibration are carried out within the framework of the World Meteorological Organization, of which ZHMS is a permanent member.

- Weather radars provide the basis for the location of precipitation areas during hazard events and rescue operations. However, ZHMS does not have weather radars. Thunder tracking is performed within the network and the LINET VIEW tool;
- ZHMS does not have access to radar data from neighbouring countries;
- A substantial problem that ZHMS is facing is the rapid reduction of the number of drought stations from 200 in 2000, to 67 in 2010 to only 20 stations, which are currently in operation. Due to the lack of financial support, these types of stations were reduced in number. ZHMS has a good coverage of Montenegro with 51 hydrological stations (31 in Black Sea basin²⁴ and 20 in Adriatic Sea basin) of which 31 are automatic and connected with the centre in Podgorica. Lack of funds is ZHMS's main issue with regard to complete the automatisisation of the remaining stations in the network.

Hydro-meteorological data management systems

Information about data (metadata) is stored in CLIDATA database in the ZHMS. The database contains:

1. Meteorological data on: air temperature (forward, maximum, minimum); the amount of precipitation; air pressure; sunshine; relative humidity; soil temperature at different depths; state of the soil; the height of the snow cover; horizontal visibility; the speed and direction of the wind; atmospheric phenomena; cloudiness; occurrences with cloudiness; genus, type of cloud base height; the sea water temperature; the state of the surface; and the direction of the wave motion.
2. Hydrological data on: hydrometric measurement of surface waters; water level; flow.
3. Water quality data on: physical and chemical parameters of water; microbiological and saprobiological parameters of water

Hazard analysis and mapping to support risk assessment

- In Montenegro, there is no inventory or list or database of past floods or droughts. This database as described previously was managed by ZHMS, as part of its regular institutional activities. Also, all information on extreme weather and climate events is regularly sent to the World Meteorological Organization (WMO).
- The Water Directorate has some technical capacity in terms of hydrological analysis and mapping, but they are not really exploited as the technical work is usually conducted by external service providers.
- In general, there is no systematic process for flood and drought hazard analysis nor mapping;
- Main gaps include the lack of coordination, collaboration and communication among various institutions, which are responsible for specific components of floods or drought risk assessment. Concerning disaster impact data, the global as well as Montenegro's practice is that relevant organizations collect data pertaining to their sector and hazards that impact

²⁴ The surface of the Black Sea basin in Montenegro is slightly larger than the surface of the Adriatic Basin, and is about 7 260 km². From this part, the Ibar River runs through the Western Morava, while Lim, Cave, Piva and Tara pass through the Drina with its tributary Komarnica.

them. However, no formal mechanisms have been developed for unifying, storing and accessing this data.

Forecasting

- Lack of professional staff who is available for operational services for analysing and weather forecasting;
- ZHMS has limited computing resources, and actually there is no backup system available to ensure sound computing in case of emergency. This makes the national DRR system at all levels quite vulnerable;

Warning products and services

- Currently there is no law, which would define the responsibilities and mandates concerning production and dissemination of warnings and alarms for natural hazards;
- ZHMS does not analyse potential impacts of the hazards. ZHMS does not warn for floods or flash floods, but it alerts for heavy precipitation and high water levels and indicates whether it might lead to flooding. ZHMS disseminates information and early alerts to the public dissemination via mass media, information about weather condition to Directorate for Emergency Situations via bulletins, warning dissemination and alerting via Operational-Communication Centre 112, and via Fax to Directorate for Emergency Situations in case of an expected emergency situation, bulletins, reports, studies for MARD and information about floods and other hazards provided by official reports and direct communications to MARD.

Human resources

- Insufficient number of professional staff to produce critical data for analyses of hydro-meteorological extremes and to operate an adequate early warning system for hydrological and meteorological hazards;

Damages and losses assessment

Commissions in charge for assessing the damages and losses caused by natural disasters are established at the local level, by the decision of the Mayor. Though they claim to involvement of experts of different profiles, it is indicative that members of the commissions at the local level are usually employed by the municipality.

Those commissions typically have no unique rulebook to work by. That means that there is no predefined procedure, timeline or the methodology in place for assessing the damages and losses to agriculture. Moreover, there is no clear definition of natural disaster either, so it happens that the damage has been caused by fire (destroying hay for example) and commission is invited to prepare the assessment, while it does not report on the causes of the fire, as this falls under the authority of the police.

The assessment procedure is initiated by the submission of the application/request for compensation by an individual who suffered from damage. Based on the received application, the

commission goes to the field to check on the case. Under the most favourable circumstances, this is conducted within two days upon receipt of the application, but there is no strict deadline prescribed (by the rulebook). For example, it has been agreed as an internal rule in the Capital City of Podgorica to inspect the damage within two days since the application is received, and prepare the report on the damage within a period of up to 30 days (in case of municipality Danilovgrad²⁵).

Reports are submitted to the National Commission for the Assessment of Damages from Natural Disasters. This National Commission collects submissions from all municipalities and reports once in a quarter to the Government. According to the information received, the National Commission does not control or provide comments on received reports from the municipalities. Moreover, it does not report back to the municipalities to inform them about (un)paid compensations or provide any feedback related to the prepared report. The exception is when it comes to damages that occurred in more than one municipality and losses caused by the same hazard. In this case, a joint report needs to be prepared by the National Commission based on the data/reports of the municipal/local commissions. Financial resources intended to compensate for the damage are transferred to the account of the affected municipality, and then the resources are proportionally shared among the agricultural producers according to the submitted report on the evaluation of any damage (Generally, a maximum of 10 percent of the estimated value is usually provided as compensation for the damage that has been occurred).

In general, there is no established budget line for the compensation of the damages caused by natural hazards at the local level, although there are some exceptions. For example, the municipality of Danilovgrad has a budget for 2016 of € 20,000 for compensating for damages caused by the natural hazards, including those damages and losses that impacted the agriculture sector.

There is no budget line in the national budget either devoted to the compensation of damages from natural disasters in agriculture. As a result, compensations are paid depending on the availability of funds as part of the budget reserves. For example, in 2010, € 0.27 million has been paid for those purposes from the budget reserves, while for the same purposes the amount reached € 1.1 million in 2015. The table 5 below contains the official data received from the National Commission on contributions paid to households as well as directly to the municipalities, based on the damages and losses assessment requests submitted. Also, information about the total value of submitted requests is presented.

Table 5 Damages and losses caused by natural disasters to agriculture (€), 2014-2016

	Total value of requests submitted	Amounts paid directly to families	Amounts paid to the municipalities
2014	836 130	62 840	
2015	1 094 190	86 600	47 500
2016	108 450	9 150	10 000

Source: Government of Montenegro, Commission for Assessment of Damages from Natural Disasters, June 2016

Although there is no database on received reports from the municipalities at the local level, according

²⁵ Due to lack of any rulebook or written material to witness the procedure of the assessment of damages and losses from natural disasters at the local level, two municipalities out of 23 were contacted: Podgorica as the largest one and capital of the country, and Danilovgrad which is one of the smallest municipalities but with developed agriculture.

to the Secretary of the National Commission, only between 5 to 10 percent of the value assessed by municipalities is paid annually. For example, in 2014 there were 314 applications in the municipality Danilovgrad whose total value of assessed damages reached almost € 0.8 million (compared to € 0.07 million paid for all 23 municipalities). In Podgorica, the number of received applications in 2014 reached almost 700.

By 2007, there was a Law on Protection from the Natural Disasters, which prescribed (article 68) that the Government is involved in the protection and provision of assistance only if damage occurred exceeds 10 percent of the national income generated at the level of the municipality in the previous year. Such clearly defined threshold for State's involvement does not exist currently. The municipal commission would assess the damage within 30 days upon receiving the application and this was based on the *"Instruction regarding the Methodology for Damage Assessment caused by natural hazards"* (from 1987). By Law the compensation could not have been paid for the damaged property that was insured or was supposed to be insured following existing regulation.

Agricultural insurance

With the likely increase in the frequency as well as intensity of extreme weather events, as a result of climate change, farmers will be more exposed and may be more impacted by these external shocks and stresses. Insuring their crops against these events helps to transfer risks from farmers to a risk bearer (i.e. an insurance company) as a risk management strategy.

Agricultural insurance support is provided by the Ministry of Agriculture, in particular the Directorate for Agriculture and Fisheries and competent inspectorates, in co-operation with the insurance company "Lovćen osiguranje doo", according to an agreement on co-financing of insurance premiums for the insurance of agricultural production. At the moment, there is only one company that offers this insurance product, despite the Ministry's proactive promotion to stimulate other insurance companies to also offer this service.

Risk management support in agriculture thus consists of financing part of the insurance premiums, in order to insure against crop and livestock damage incurred by registered agricultural holdings. The basic insurance covers damage caused by fire, thunder and hail. Additional insurance covers e.g. frost, floods and storms.

In order to insure animals, it is necessary to perform regular veterinary examinations where all the prescribed requirements for animal welfare and health protection are fulfilled. While for the insurance of crops and fruits, all agro-technical measures and good agricultural practices need to be fulfilled as mentioned in the Code of Good Agricultural Practice. This Code includes good agricultural practices and technologies, such as appropriate collection, storage, disposal of animal and liquid manure to ensure that water sources are not polluted, reconstruction and restoration of existing terraces and stonewalls to prevent erosion.

The Ministry can provide up to 50 percent of the insurance premiums. This insurance support is provided on the basis of agricultural producers that are registered in the main registry as well as with Veterinary Services. The premium can vary from € 50 to 5 000, as it is calculated on the basis of

the size of the agricultural holding and the type of hazard insured. The first contact is between the agricultural producer and the insurance company with a Commission visiting the farm to calculate the premium amount. With this insurance offer the producer will request the Ministry of Agriculture for the subsidy approval. Once approved the government payments are directly transferred to the insurance company.

MARD's budget for providing this agricultural insurance support for 2016 was € 200 000. A total of 69 certificates were issued for the co-financing of insurance products, resulting in 3 producers more than in the previous year. This translated in 2016 in the payments of € 18 883.97 or 9.4 percent of this total budget amount. Of the total of 69 certificates issued for co-insurance premiums, 44 were related to the co-financing of insurance of animals. Mostly these animals were insured against death, emergency slaughter or killing due to illnesses or accidents. The amount insured and the insurance premium is determined by the intensity of cattle raising, whereby a difference is made between medium intensive and highly intensive farming. For instance, the insurance premium for 3 up to 20 heifers, which are grown in medium intense conditions is € 156, while the insurance premium for two heifers, which are grown in very intensive conditions is € 364.

The Government of Montenegro has provided subsidies of up to 50 percent of the total amount for insurance premiums since 2012 for crops, agricultural infrastructure and livestock via the agro budget item 'Risk management in agriculture', which only covers insurance. The penetration of agricultural insurance is still quite low, which is the result of farmers considering the insurance premiums as high but also believing that "it will not happen to them". Also, while perceived as immediate cost, paying insurance premium does not contribute to the overall yield. Various awareness raising activities have been organised in the past to increase the level of knowledge and information of farmers.

5 Conclusions and recommendations

Montenegro is prone to natural hazards, in particular, floods, droughts, storms, landslides and forest fires. Its agriculture sector is expected to experience adverse impacts of climate change, including more and more severe floods, droughts and forest fires among others, as well as the spread of plant and animal pests and diseases.

Its legal and institutional DRR system includes the Law on Protection and Rescue, which focuses on protection and rescue of population, but also aims to prevent and mitigate risks. The National Strategy for Emergency Situations, adopted in 2006, is the basis for establishing the concept of disaster risk reduction, including the operational and institutional structure for DRR. The agriculture sector is primarily mentioned within the context of animal health with the proposed measures and activities still mostly focused on response instead of prevention, mitigation and preparedness.

The extent of DRR mainstreaming within relevant sectorial policies, plans and strategies is limited. Natural hazards and climate change are mentioned here and there, but the main focus remains on the EU accession process and alignment of national rules and regulations with the EU, which is aimed at enhancing sustainability and protection of the environment. Within the Agricultural strategy, an emphasis is placed on the promotion of animal health and well-being, so more on controlling the spread of animal plant pests and diseases, while forest fire prevention and management is mentioned within the Forestry strategy and are under the responsibility of the Ministry of Agriculture and Rural Development. The 2013 Code of Good Agriculture Practice also includes some of these DRR measures related to soil erosion and animal health. Flood protection is included in the Water management strategy, but more in a broad sense, such as coordinated action for flood protection, efficient and continuous monitoring and forecasting of floods, regular maintenance and control of watercourses, drainage. It only mentions anti-erosion protection and soil conservation, but no details on specific agriculture measures that should be promoted.

This overview document has provided insights into the analysis, which has been conducted, in terms of the various constraints, challenges and limitations of existing operational and institutional collaboration, coordination capacities as well as the lack of financial resources and limited human resources for the design, implementation, monitoring and evaluation of DRR related measures for the agriculture sector.

In order to enhance *effective disaster risk reduction and management for the agriculture sector*, including the crop, livestock, fisheries and forestry subsectors, the following recommendations are, among others, suggested:

- Enhance the mainstreaming of DRR and specific DRR measures into sectorial laws, plans, policies and strategies as well as ensuring strong linkages between DRR and CCA;
- Strengthen the professional institutional capacities (technical and human resources) for the coordination and collaboration of DRR/M activities, in particular for the agriculture;
- Establish a database, which systematically collects historical hazard data by sectors and ensure regular updating. In addition, improve inter-institutional coordination for accessing this database;

- Promote the development of scientific studies, analyses, surveys, projects of climate change impacts on agriculture and subsectors;
- Conduct trainings for agricultural producers and extension officers, including the involvement of researchers, to enhance the dissemination of knowledge and information about appropriate DRR and CCA measures;
- Undertake regular maintenance and upgrading of flood defence and drainage systems;
- Systematize and improve existing processes, procedures, timelines and methodology for conducting damage and losses assessment and post-disaster needs assessments, especially for the agriculture sector.

The following recommendations are suggestions for *enhancing early warning and information systems*:

- Improve the existing information and risk management systems, with regard to systematic multi-hazard analysis and mapping, including for floods and droughts in line with the EU Water Framework and Flood Directives;
- Build the capacities of relevant staff to conduct analyses, mapping and disaster risk assessments;
- Strengthen the network of weather stations, including automatisisation of stations, for the monitoring of hydrology and meteorology in Montenegro.

Suggestions for enhancing disaster risk assessments and mapping, especially for drought, in Montenegro, include:

- Develop a national drought risk assessment;
- Undertake risk mapping and developing a national risk map related to drought
- Establish a national disaster risk reduction plan for drought;
- Set up a national damage and losses database, in particular including agricultural data;
- Increase overall awareness of stakeholders, including citizens and policy makers at the national and local levels to reduce drought risk as well as other types of risks;
- Develop local drought risk assessment, mapping and local plans.

With regard to *strengthening forestry management and forest fire management*:

- Enhance forest management planning, in terms of encouragement of natural regeneration, mixed compositions, balanced usage of forest (e.g. planning of wood cutting to avoid erosion and flooding), forest protection, rehabilitation of degraded forests;
- Implement and monitor the Fire Hazard Index as a vulnerability indicator for certain areas during the fire season;
- Improve communication and information sharing between all relevant stakeholders in the forestry sector;
- Enhancing infrastructure and equipment for forest fires management, adequate supply of fire engines to extinguish forest fires, including the accompanying equipment for the primary action in the regional offices of the Forest Administration e.g. fire-lines against fire, removing combustible materials from the forests; establishment of checkpoints with supplies for fire frightening, higher control of the activities in the forests during the dry period;
- Implement development plans and programmes for forest management as well as ensure their practical application and implementation;

- Better control of the implementation of concession agreements, which refers to building and preserving forest roads as well as afforestation.

In order to *enhance agriculture insurance*, the following activities are recommended:

- Support the increase of insurance companies that offer agriculture insurance;
- Share knowledge and information, for instance through trainings, to agriculture producers with regard to adopting and adhering to the agro-technical measures and good agriculture practices as outlined in the Code of Good Agriculture Practice, which serves as a guidance manual and following these good practices is one of the mandatory rules for the insurance of crops and fruits;
- Increase awareness among agriculture producers of the relevance of insurance to help reduce risks. If more agricultural producers would buy insurance the premium will be lower, of which up to 50 percent is currently provided as subsidies by the government.

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