



ADAPTATION TO CLIMATE CHANGE: **MONTENEGRO**

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LIST OF ABBREVIATIONS

ADA	- Agency for Agricultural Development
COS	- Civil Society Organisation
EBRD	- European Bank for Reconstruction and Development
EIB	- European Investment Bank
EU	- European Union
GCF	- Green Climate Fund
GEF	- Global Environment Facility
GHG	- Greenhouse gas
GIZ	- Deutsche Gesellschaft für Internationale Zusammenarbeit
INDC	- Intended Nationally Determined Contribution
IPCC	- Intergovernmental Panel on Climate Change
KfW	- Kreditanstalt für Wiederaufbau
LuxDev	- Luxembourg Agency for Development Cooperation
MSDT	- Ministry of Sustainable Development & Tourism, Montenegro
MSNC	- Montenegro Second National Communication on Climate Change
MTNC	- Montenegro Third National Communication on Climate Change
MTNA	- Montenegro Technology Needs Assessment
NECDP	- Nationally Energy and Climate Plan
NPP	- Net Primary Productivity
REC	- Regional Environmental Center for Central and Eastern Europe
SPI	- Standardised Precipitation Index
UNDP	- United Nations Development Program
UNECE	- United Nations Commission for Europe
UNFCCC	- United Nations Framework Convention on Climate Change

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1. Introduction

THIS REPORT HAS BEEN WRITTEN AS PART OF THE EU-FUNDED “TOGETHER FOR A BETTER CLIMATE IN MONTENEGRO” PROJECT, THE AIM OF WHICH IS TO STRENGTHEN PUBLIC PARTICIPATION IN DECISION MAKING IN THE FIELD OF CLIMATE CHANGE. WITHIN THIS CONTEXT, CIVIL SOCIETY ADVOCACY IS NEEDED IN MONTENEGRO WITH RESPECT TO THE EU CLIMATE ADAPTATION FRAMEWORK, AND THE AIM OF THIS REPORT IS TO SUPPORT THIS ADVOCACY BY REVIEWING THE STATUS OF CLIMATE CHANGE ADAPTATION POLICY FORMULATION AND ITS IMPLEMENTATION IN MONTENEGRO, IN THE CONTEXT OF THE EU CLIMATE ADAPTATION FRAMEWORK.

INFORMATION FOR THIS REPORT HAS BEEN OBTAINED FROM OFFICIAL DOCUMENTS, ACADEMIC ARTICLES, NGO REPORTS, MEDIA BULLETINS, AND INTERVIEWS WITH SELECTED KEY MONTENEGRO GOVERNMENT OFFICIALS, NGO REPRESENTATIVES, AND INDEPENDENT EXPERTS.

SECTION TWO EXAMINES THE IMPACTS OF CLIMATE CHANGE, SECTION THREE DESCRIBES VULNERABILITY TO THESE IMPACTS, SECTION FOUR LAYS OUT ADAPTATION ACTIONS THAT ARE NEEDED, SECTION FIVE LISTS THE POLICIES RELATED TO CLIMATE CHANGE SINCE 2006 WHEN MONTENEGRO RATIFIED THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, SECTION SIX DESCRIBES BARRIERS TO POLICY IMPLEMENTATION, AND SECTION SEVEN PROVIDES A SUMMARY AND SET OF CONCLUDING REMARKS. A LIST OF STAKEHOLDERS INTERVIEWED FOR THE INFORMATION CONTAINED IN SECTION SIX IS PROVIDED IN AN ANNEX.

2. Impacts

WHAT ARE THE BIOPHYSICAL IMPACTS OF CLIMATE CHANGE ON MONTENEGRO?

BIOPHYSICAL IMPACTS ARE CHANGES TO THE BIOTIC (LIVING) AND ABIOTIC (NON-LIVING) ELEMENTS OF AN AREA THAT HAVE CAUSES. CURRENTLY THERE IS INSUFFICIENT DATA, IN TERMS OF QUALITY AND QUANTITY, TO PROVIDE DETAILED DESCRIPTIONS ON THE ACTUAL BIOPHYSICAL IMPACTS OF CLIMATE CHANGE ON MONTENEGRO BY GEOGRAPHIC REGION AND SECTOR¹. FOR THIS REASON, THIS SECTION ORGANIZES BIOPHYSICAL IMPACTS INTO MONTENEGRO'S MOST PRESSING CLIMATE HAZARDS WHICH ARE SUFFICIENTLY EVIDENCED IN MONTENEGRO'S THIRD NATIONAL COMMUNICATION 2020 IN COMBINATION WITH REPUTABLE SCIENTIFIC SOURCES.

2.1 Impacts described by climate hazards

In this report, 'climate hazards' refer to localised physical events and trends that link to regional climate change². Therefore, climate hazards are physical impacts of climate change that are particularly destructive and require immediate attention to optimise adaptation efforts.

"It is impossible to link an individual natural hazard directly to climate change, but the link between climate change and an overall increase in the frequency and intensity of hydrometeorological hazards is recognized."

Montenegro Third National Communication on Climate Change (2020)

This section focuses on the climate hazards of droughts, forest fires, heatwaves, and floods which most affect Montenegro and have the strongest links to climate change.

2.1.1 Droughts

With recorded and projected increases in temperatures and decreases in rainfall during the summer and autumn, the magnitude and occurrence of droughts is expected to increase further. Montenegro is a drought susceptible country with large areas of quickly drying soils that become drier by temperature increases even if precipitation rates do not decrease. Droughts significantly lower water levels which cause negative secondary impacts on biophysical systems such as forest fires and significant reductions in hydro-electric production and crop yields.

According to Montenegro's Third National Communication (2020), drought monitoring is achieved by the combination of SPI, remote sensing data, a national network of reporters who provide near

1 MSDT (2019). Ministry of Sustainable Development and Tourism. Montenegro: *Second Biennial Update Report on Climate Change (BUR)*. Available at https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/5937861_Montenegro-BUR2-1-SECOND%20BIENNIAL%20UPDATE%20REPORT%20ON%20CLIMATE%20CHANGE_Montenegro.pdf; MSNC (2015) *Second National Communication on Climate Change of Montenegro to the United Nations Framework Convention on Climate Change*. Ministry of Sustainable Development and Tourism of the Republic of Montenegro. Available at https://www.me.undp.org/content/montenegro/en/home/library/economy_environment/SNC.html; MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version; UNECE (2015). *Environmental Performance Review – Montenegro*. Third Review. Available at <http://www.unece.org/index.php?id=39845>

2 IPCC (2014) Climate Change Synthesis Report: Summary for Policymakers Chapter

real time data about drought conditions and the Drought Watch tool. In the last three years (2017-2019) there have been consecutive hydrological droughts that lowered the water levels of the economically vital rivers of Moraca and Zeta the Skadar Lake and negatively impacted the sectors of agriculture, energy and fishery³.

The 2011 drought created an extreme hydrological deficit in the region of Zeta Bjelopavlići which is the country's main agricultural area. The drought threatened the country's food security because low water availability reduced crop yields and increased costs for irrigation and the prevention and management of diseases, weeds and insects⁴. This pattern continues and is further evidenced by the EU Interreg project (2017-2019), DriDanube. The project found that successive droughts have particularly disturbed the water balance in the southern regions of Montenegro in late Autumn and estimated reductions in fruit yield are likely to continue occurring (see figure 2.1).

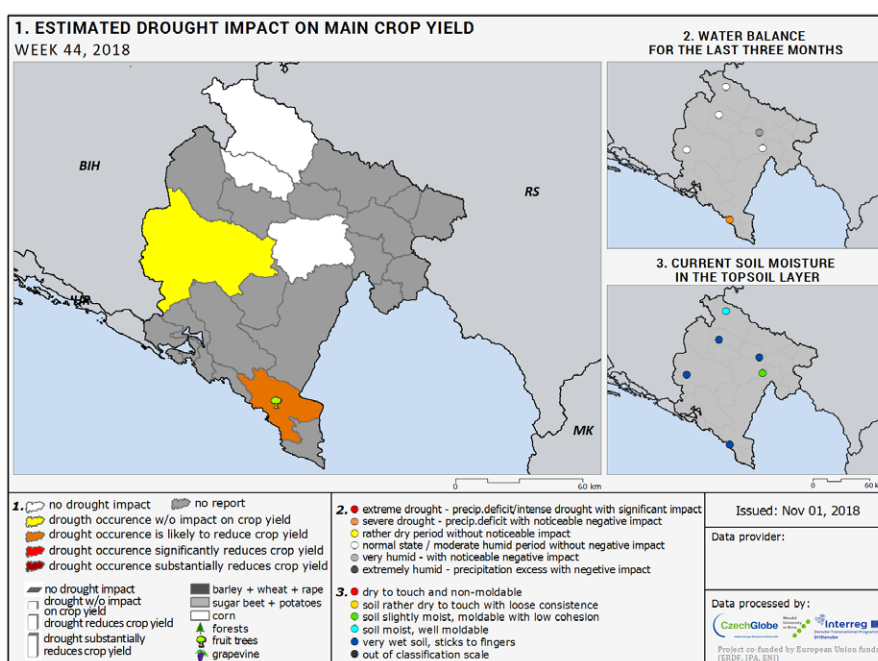


Figure 2.1 Mapping impacts of 2018 drought on water balance, soil moisture and crop yield (Source: Interreg-Danube 2019)

2.1.2 Forest Fires

The increase in the magnitude and frequency of draughts drought in Montenegro corresponds with increases in forest fires. Approximately 800 large forest fires occurred between 2005-2015, burning more 18,000 ha of forests and 800,000m³ of wood mass⁵. 2017 saw the country's worst season of forest fires affecting six times more forest area than 2016. Most damage occurred in July and August with the largest fire burning 5,687 ha in Danilovgrad⁶. Figure 2.2 maps the burnt areas in 2017 which concentrated in the southern, middle and south-western regions of Montenegro, which remain at high risk of future forest fires.

³ MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

⁴ MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

⁵ REC (2015). Regional Environmental Center for Central and Eastern Europe. *Forest Fires in South Eastern Europe – A Regional Report*. Available at <http://gfmcc.org/wp-content/uploads/EU-Forest-Fires-in-Europe-2017.pdf>

⁶ Jesús San-Miguel-Ayanz et al. (2018). *Forest Fires in Europe, Middle East and North Africa 2017, JRC Technical Reports, European Union*. Available at <http://gfmcc.org/wp-content/uploads/EU-Forest-Fires-in-Europe-2017.pdf>

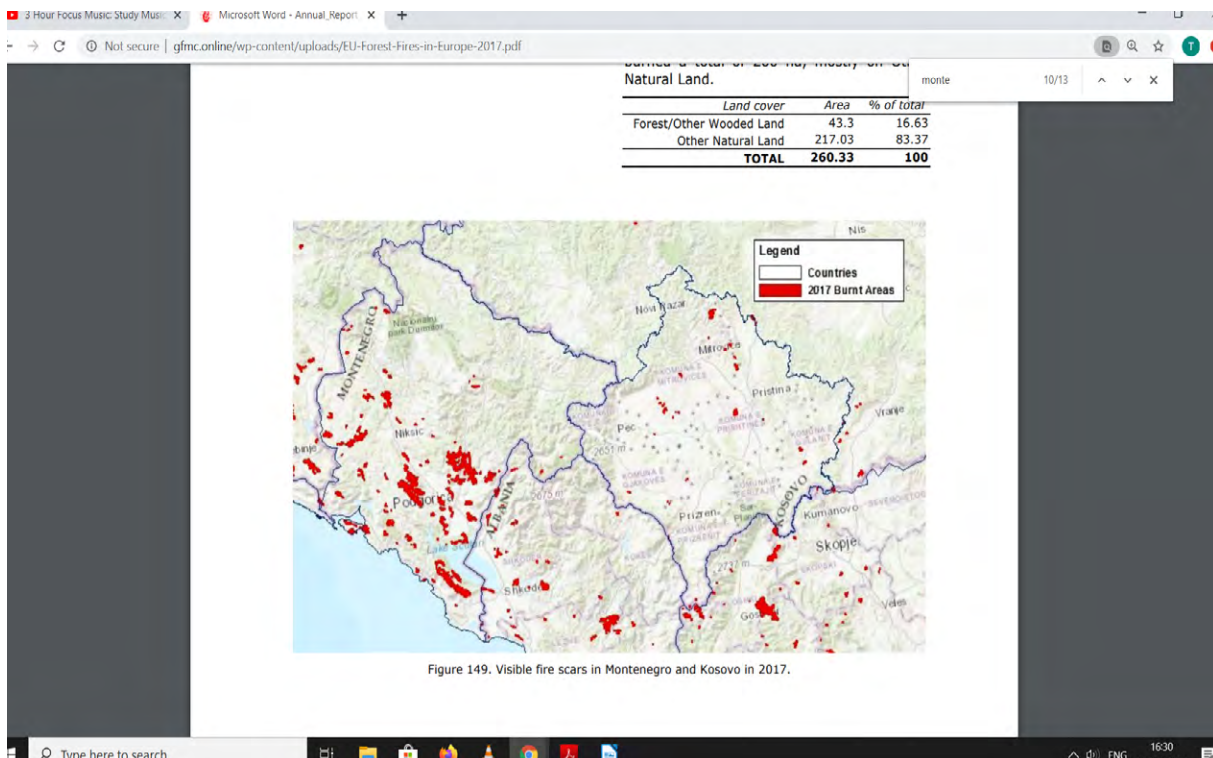


Figure 2.2. Visible burnt areas in Montenegro and Kosovo 2017
(Source: Jes es San-Miguel-Ayanz et al. 2018)

Recorded and predicted climate change patterns of higher temperatures, infrequent rainfall and strong winds provide ideal conditions to exacerbate the ignition and rapid spread of forest fires in Montenegro. The secondary impacts of forest fires are significant with substantial population decreases in wildlife threatening biodiversity loss. The Ministry of Agriculture and Rural Development estimates that the loss of 6,500 ha of forest cover will lead to costs of approximately €6 million euros⁷.

2.1.3 Heat waves

Heatwaves are perhaps one of Montenegro's most significant climate hazards in relation to climate change. The recorded increases in air temperatures, especially in the summer months, have strongly corresponded with a higher frequency and duration of heat waves in the country⁸. There is sufficient data available to evidence long-term and continuous increases in the duration of heatwaves. Figure 2.3 visualizes the increased frequency of heat waves in Podgorica between 1949 and 2017, which are exacerbated by the urban heat island effect. June and July record the highest frequencies of heat waves whereas August has the longest. In 2012 a strong heatwave impacted more than 4,500 people, particularly the health of high-risk groups. With climate projections expecting 2 to 2.5C increases in the summer months, heat waves will be longer, more frequent and harmful⁹.

7 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

8 MSNC (2015) *Second National Communication on Climate Change of Montenegro to the United Nations Framework Convention on Climate Change*. Ministry of Sustainable Development and Tourism of the Republic of Montenegro. Available at https://www.me.undp.org/content/montenegro/en/home/library/economy_environment/SNC.html

9 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

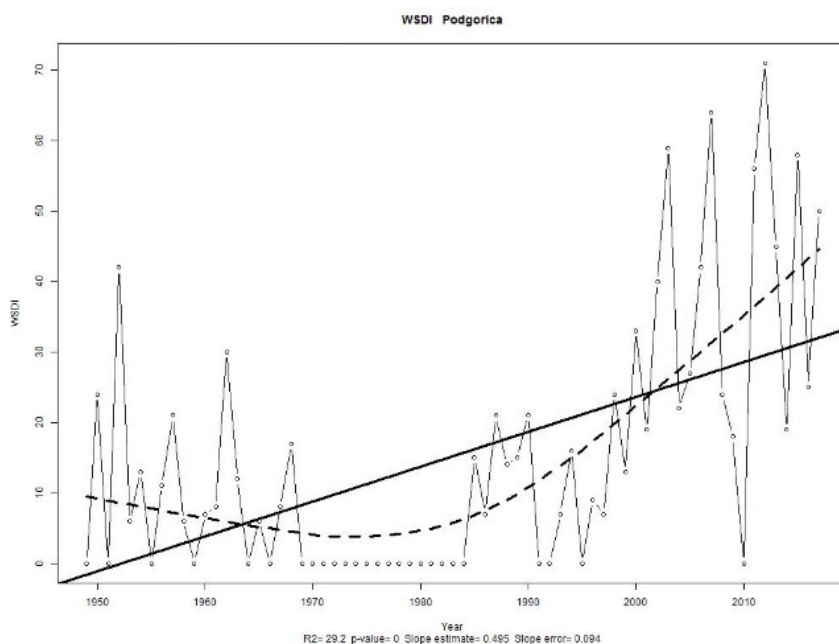


Figure 2.3 Occurrence of heat waves in Podgorica from 1949 to 2017
Source: International Disaster Database (www.emdat.be)

2.1.4 Floods

Montenegro expects an increase in the risk of major flood events with three floods having occurred in 2007, 2009 and 2010. Although overall reductions in precipitation have been recorded and projected for Montenegro, the northern region is expected to experience an increase in rainfall of up to 5% in the winter months. Furthermore, the indicators of extreme precipitation, such as daily intensity, have increased in the north, contributing to the severity of flood events. According to the Montenegro's Third National Communication to the UNFCCC (2020), the "particularly sensitive areas for heavy rainfall are the Ulcinj field (at high water levels of Bojana), the zone Vladimir to Veiki Ostros, and from Sutomore to Virpazar, the area of old town of Kotor, Sutorina, Herceg Novi, Crkvice and part of the Lustica peninsula".

The consequences of floods are expected to be frequently significant. The 2010 flood cost approximately €44 million¹⁰; and, 30,000 ha of agricultural land was affected with total damages and losses estimated above €13 million¹¹. The municipalities of Niksic and Kolasin experienced the most recent significant flood in 2019: d. Damage on to households and infrastructure, roads and bridges, was calculated at approximately €211,500¹².

10 EM-DAT (2019). *International Disaster Database Reports for Montenegro*. Available at www.emdat.be

11 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

12 RTCG (2019). Radio Televizija Crne Gore: "Šteta od poplava u Nikšiću 73 hiljade eura". Available at <http://www.rtcg.me/vijesti/drustvo/260836/steta-od-poplava-u-niksicu-73-hiljade-eura.html>

3. Vulnerability

HOW IS MONTENEGRO'S ECONOMY AND SOCIETY VULNERABLE TO THE BIOPHYSICAL IMPACTS OF CLIMATE CHANGE?

AS OF YET, SCIENTIFIC RESEARCH ON MONTENEGRO'S VULNERABILITIES TO CLIMATE CHANGE HAS BEEN SIGNIFICANTLY LIMITED BY THE USE OF INSUFFICIENT DATA, RUDIMENTARY METHODOLOGIES, AND UNSOPHISTICATED MODELS¹³. THEREFORE, DETAILED ASSESSMENTS AND SIMULATIONS OF THE DISTRIBUTED EFFECTS OF CLIMATE CHANGE ON SOCIO-ECONOMIC SECTORS ARE MOSTLY MISSING. THIS SECTION PROVIDES A SYNTHESIS OF AVAILABLE RESEARCH RESULTS, WHICH, ALTHOUGH LIMITED, SERVE AS SUBSTANTIAL STARTING POINTS FOR FURTHER SCIENTIFIC INVESTIGATION AND CLEARLY INDICATE THAT "NEGATIVE IMPACTS HAVE TO BE EXPECTED AND ADAPTATION MEASURES ARE NECESSARY"¹⁴.

3.1 Vulnerabilities described by socio-economic sector

In this report, vulnerability is analysed as a sector's sensitivity to be affected by climatic variables and hazards in combination with its adaptive capacity, i.e. its ability to adjust to them. Therefore, socio-economic sectors with high sensitivity and low adaptive capacity equate to high vulnerability and justify being prioritised for adaptation strategies and resource allocations.

The most vulnerable socio-economic sectors, identified by Montenegro's Third National Communication (2020) are water resources, forestry, agriculture, coastal areas, public health and urban areas. This section describes the vulnerabilities of each of these socio-economic sectors by combining research on the historical impacts of climate change on Montenegro's sectors with that of probable future impacts from the latest climate change projections.

3.1.1 Water Resources

Montenegro's water resources sector is most vulnerable to the climatic decreases in precipitation and increases in temperature and heavy rains. Figure 3.1 summarises the actual and potential impacts of these changes on the sector. Generally, reduced yields in quantity and quality from Montenegro's water sources are expected which means more costly and reduced water supply to most residential areas as well as less capacity for industrial and commercial uses. For example, reductions in rainfall run-off are estimated to reduce gross revenues from hydroelectricity sales from Mratinje Dam by €6.6-12.8 million a year¹⁵.

13 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version; UNECE (2015). *Environmental Performance Review – Montenegro*. Third Review. Available at <http://www.unece.org/index.php?id=39845>; Callaway, J., Kaščelan, S. and Markovic, M. (2010). *The Economic Impacts of Climate Change in Montenegro: A First Look*. Report prepared for the Office of UNDP, Montenegro. Available at <https://www.undp.org/content/dam/montenegro/docs/publications/ee/The%20Economic%20Impacts%20of%20Climate%20Change%20in%20Montenegro.pdf>

14 UNECE (2015). *Environmental Performance Review – Montenegro*. Third Review. Available at <http://www.unece.org/index.php?id=39845>

15 Callaway, J., Kaščelan, S. and Markovic, M. (2010). *The Economic Impacts of Climate Change in Montenegro: A First Look*. Report prepared for the Office of UNDP, Montenegro. Available at <https://www.undp.org/content/dam/montenegro/docs/publications/ee/The%20Economic%20Impacts%20of%20Climate%20Change%20in%20Montenegro.pdf>

Climate change and hazards	Historical and Potential impacts
Increase in air temperature	<ul style="list-style-type: none"> • Causes increase in water use especially in summer periods and this can reduce net water supply, increase competition for water and reduce access to water quality and quantity • Increases in air temperature and water temperatures reduce habitat quality and productivity and can degrade ecosystems
Decrease in precipitation	<ul style="list-style-type: none"> • Insufficient water for irrigation • Water quality will decrease and sediment transport will increase due to reductions in run-off and warmer water temperatures • Affects the performance and operation of existing and planned man-made hydrological systems. • Decrease in average annual yields of rechargeable systems and/or increase pumping costs for groundwater supply • Ground water table levels decrease
Heavy rains	<ul style="list-style-type: none"> • Increases in peak run-off increase flooding, erosion and sediment transport, and adverse health impacts • River and lake flooding of urban, suburban and rural land • Drinking water safety • Waterborne disease vectors • Affect rural and suburban drainage

Figure 3.1 Summary of climate change impacts on Montenegro's water resources sector
Sources: Second & Third National Communication on Climate Change

Of Montenegro's ninety water sources or springs, only forty-nine have legal protection status¹⁶. The southern and coastal regions are projected to become the driest and water scarce which is also where most of the population lives in urban areas. Urban areas are particularly vulnerable due to high percentage of impermeable surfaces prone to flooding and high population densities equating to intense and increasing water use from higher temperatures.

With recorded and projected reductions in annual snowfall the hydrological minimum could shift from September to early August which coincides with peak water use due to tourism. Climate change in combination with acute urban and touristic pressures on catchment areas and lack of legal protections means high vulnerability for many of Montenegro's water sources and consequent water supply¹⁷.

3.1.2 Forestry

The forestry sector is particularly vulnerable because of its sensitivity to decreasing precipitation and increasing air temperatures meaning more frequent and intense occurrences of forest fires. Combined with the projected increase in floods and droughts, any gains in the long-term net primary productivity (NPP) of most trees from increased CO2 concentrations will be limited¹⁸.

The coastal and central regions of Montenegro are identified as most vulnerable to forest fires because they are also where most droughts occur, which are projected to be more severe and frequent in the long-term¹⁹. Forest fires reduce tree's resistance to pests which negatively impact on tree health, exacerbating vulnerabilities further. Other notable impacts of climate change to the forest sector are summarised in figure 3.2.

16 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

17 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

18 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

19 Interreg-Danube (2019). *DriDanube – Drought Risk in the Danube Region*. Available at <http://www.interreg-danube.eu/approved-projects/dridanube>

Climate change and hazards	Historical and Potential impacts
Increases in CO ₂ concentrations	<ul style="list-style-type: none"> • Increase in long-term net primary productivity (NPP) of most trees. Differential species impacts that could affect the competition and succession, particularly in mixed forests. • Increased soil acidity and heavy metal concentration
Changes in precipitation regime	<ul style="list-style-type: none"> • Drainage and deterioration of the hydrological balance of the habitat • More frequent and intense occurrence of forest fires
Increase in air temperature	<ul style="list-style-type: none"> • NPP response depends on where forest species are in relation to their temperature ranges. In the short-run, warming can lengthen growing seasons. Where temperatures are limiting, the impact on NPP will be negative. • Species can adjust by migration, naturally or managed, but at some point, higher temperatures become limiting to growth over large areas. • Differential species impacts could impact the competition and succession, particularly in mixed forests • Complex effects on other stressors, such as insects and diseases can interact to limit or enhance CO₂ fertilization • More intense mushroom development and more frequent occurrence of harmful insects due to temperature increase • More intensive drying of forests and individual tree species, which could result in their dying, migration and / or adaptation • Increases in vulnerability to forest fires • Less frequent onset of frost due to reduced number of frost days
Increases in the magnitude and frequency of droughts and floods	<ul style="list-style-type: none"> • Long-term increases in droughts and floods will probably have a negative impact on NPP • Increasing risk of erosion

Figure 3.2 Summary of climate change impacts on Montenegro's forestry sector
Sources: Second & Third National Communication on Climate Change

In addition to high sensitivity, the adaptive capacity of the forestry sector is low because there are insufficient levels of cooperation between the research sector and decision makers and managers²⁰. An expert advisory body does not yet exist nor do funded research programs which together enable the forestry sector to map vulnerabilities in detail and then decide and execute adaptation action plans for each differently affected area and water basin.

3.1.3 Agriculture

Agriculture is a sector highly vulnerable to climate change due to its dependence on water conditions, temperatures and consequent sensitivity to extreme weather events. In Montenegro, irrigation systems cover 1% of arable land which means agriculture is highly dependent on rainfall projected to decrease in total amounts and frequency²¹. Combined with more intense short rainfall events, flash floods, and more frequent and intense droughts, yields and revenues are expected to decrease while costs for irrigation, disease and pest control increase. For example, the 2012 drought reduced milk production due to reduced fodder production and new diseases from heat stress for cattle²². Furthermore, increased irrigation costs of €4.3 million a year are estimated for crops on current and new land²³. Further negative impacts of climate change on agriculture are summarised in figure 3.3 evidencing its acute vulnerabilities.

20 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

21 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

22 UNECE (2015). *Environmental Performance Review – Montenegro*. Third Review. Available at <http://www.unece.org/index.php?id=39845>

23 Callaway, J., Kaščelan, S. and Markovic, M. (2010). *The Economic Impacts of Climate Change in Montenegro: A First Look*. Report prepared for the Office of UNDP, Montenegro. Available at <https://www.undp.org/content/dam/montenegro/docs/publications/ee/The%20Economic%20Impacts%20of%20Climate%20Change%20in%20Montenegro.pdf>

Climate change and hazards	Historical and potential impacts
Increase in air temperature	<ul style="list-style-type: none"> • Shift of vegetation periods towards the beginning of the year • Sharp interruptions in the vegetation process and cause losses in yield, particularly in fruit growing cultures due to frost • Increases in crop yields (and land productivity), up to a point followed by decreases • Increases in productivity of livestock, up to a point followed by decreases • Complex effects on weeds, insects • Heat stress influences livestock and milk production, gain in muscle mass and reproduction
Decrease in precipitation	<ul style="list-style-type: none"> • Decreases in crop yields (and land productivity) • Decreased irrigation water supply • Increased irrigation water demand
Droughts	<ul style="list-style-type: none"> • Limited plant growth, and therefore substantial reduction of yields • A decrease in the content of organic matter in soils • Increasing dependency on insufficiently developed irrigation systems • Reduction in the production of fodder for livestock feed
Floods	<ul style="list-style-type: none"> • Loss of crop yield • Increased plant diseases and weeds • Increase in crop damages • Loss of livestock due to difficult evacuation

Figure 3.3 Summary of climate change impacts on Montenegro's agriculture sector
Sources: Second & Third National Communication on Climate

According to a vulnerability assessment, agricultural areas with the highest risk of droughts are the Zeta River Valley and Zeta Plain and the coastal area due to sharp inclination of the terrain²⁴. Montenegro, as with the entire region of South-East Europe is projected to have a more arid climate, making its agriculture increasingly vulnerable to droughts. Agriculture's vulnerability to climate change is further exacerbated by pre-existing land degradation in Montenegro where 15 critical areas are identified with the Morača basin being the most degraded²⁵. There is a need for better data on national SOC (soil organic carbon content), which is currently outdated and rarely geo-referenced, to gain detailed understandings on agricultural vulnerabilities and generate effective adaptation measures.

3.1.4 Coastal areas

The coastal areas are exposed to an estimated sea level rise in the Adriatic Sea of 31-65cm by 2100 while being the most developed and densely populated areas in Montenegro²⁶. Rising sea levels and temperatures correlate with more extreme weather and flooding events which increase the vulnerability of flat coastal areas of karst to erosion and eventual disintegration. A vulnerability assessment by CAMP Montenegro identified that the Bay of Kotor, Jaz Cove, Canj Cove, Buljarica Bay, Ulcinj beach and Ada Bojana beach with high vulnerability to future scenarios and projections of sea level rise and coastal flooding²⁷. More extensive impacts of climate change on Montenegro's coastal areas and marine ecosystems are summarised in figure 3.4.

24 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

25 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

26 UNECE (2015). *Environmental Performance Review – Montenegro*. Third Review. Available at <http://www.unece.org/index.php?id=39845>

27 CAMP Montenegro (2013). *Vulnerability Assessment of the Narrow Coastal Zone – Summary*. Camp Montenegro, Ministry of Sustainable Development and Tourism and UNEP. Available at http://pap-thecoastcentre.org/pdfs/vulnerability_assessment_of_the_narrow_coastal_zone.pdf

Climate change and hazards	Historical and potential impacts
Increase in air temperature	<ul style="list-style-type: none"> • Increased sea surface temperature • Reduction of the functions of coastal ecosystems • Increased demand and pressure on the water system especially in the summer season when water demand is increased due to tourism • Eutrophication and multiplication of aquatic plants • Insufficient adaptation of tourism offers in line with climate change <p>Marine ecosystem and fishery:</p> <ul style="list-style-type: none"> • Changes in the composition of natural communities, increase in the number of certain marine species, decrease or complete disappearance of some other species • Breeding of new species of marine organisms because they lack natural enemies and are not competent for food and space • Impacts on local communities in the coastal area, such as the reduction of fishermen's catches, material damage to fishing gear and the emergence of highly toxic puffer fish, dangerous to human health.
Decrease in precipitation	<ul style="list-style-type: none"> • Reduction of the amount of water availability, • Reduction of water levels in coastal wetlands
Storm winds and storms	<ul style="list-style-type: none"> • Exacerbate soil erosion, damage power lines, buildings and structures. • Increase mid-sea levels, while strong winds create high waves that can cause damage to ships, coasts and coastal infrastructure, as well as disrupt maritime traffic. • Infiltration of salt-water in water systems, especially from storm waves
Sea level rise	<ul style="list-style-type: none"> • Flooding in low-laying areas • Erosion of coastal zones and beaches
Floods	<ul style="list-style-type: none"> • Loss of attractiveness of the coastal area • Loss of economic assets • Decrease in tourism visits • Intensified erosion processes • Loss of attractiveness of the coastal area • Direct loss of income and weakening of the national economy

Figure 3.4 Summary of climate change impacts on Montenegro's coastal area
Sources: Second & Third National Communication on Climate Change

The vulnerabilities of coastal areas to the biophysical impacts of climate change directly extend to the tourism sector which predominates in the coastal regions and contributed to 23.7% of GDP in 2017²⁸. Tourist revenue concentrates in the summer months with close to 70% of total overnight stays occurring in July and August²⁹. This makes Montenegro's tourism sector and national economy highly vulnerable to climate change, particularly the predictions of excessively hot day time temperatures in Southern Europe reducing coastal tourism. A 1-5°C rise in annual average temperature is estimated to decrease the number of tourist visits by 1.7%-19.6%³⁰. Even winter tourist activities are vulnerable to climate change with recorded and projected reductions in snowfall and warmer winter conditions³¹.

28 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

29 MTDS (2009). *Montenegro Tourism Development Strategy to 2020*. Montenegro Ministry of Tourism and Environment. Available at <http://www.mrt.gov.me/ResourceManager/FileDownload.aspx?rid=89273&rType=2&file=01%20Montenegro%20Tourism%20Development%20Strategy%20To%202020.pdf>

30 Callaway, J., Kaščelan, S. and Markovic, M. (2010). *The Economic Impacts of Climate Change in Montenegro: A First Look*. Report prepared for the Office of UNDP, Montenegro. Available at <https://www.undp.org/content/dam/montenegro/docs/publications/ee/The%20Economic%20Impacts%20of%20Climate%20Change%20in%20Montenegro.pdf>

31 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

3.1.5 Public health

According to the Third National Communication on Climate Change (2020) “there is no reliable data on the impact of climate change on human health, as this data has not been integrated with compulsory health records”. In response, recent plans are made to operationalise bio-forecasting to quantitatively assess morbidity and mortality in relation to extreme weather and climatic events. This includes indirect indicators of climate change impacts such as increased incidence of food- and water-borne diseases and vector-borne diseases such as Lyme disease from increase in average temperatures³². The range of historical and potential impacts on public health, which evidence the sector’s vulnerability, are summarised in figure 3.5.

Climate change and hazards	Historical and potential impacts
Increase in air temperature	<ul style="list-style-type: none"> • Increase in transmission of food-borne diseases such as salmonella infections • Increase in the transmission of vector-borne diseases such as tick-borne encephalitis, Lyme disease, Leishmaniasis • Increase in the emergence of toxic puffer fish from high sea water temperatures
Floods	<ul style="list-style-type: none"> • Direct physical effects (drowning and injuries), • Effects on well-being (e.g. mental illnesses from the effect of flooding and displacement) • Potentially increased risk of food and water borne disease.
Heat waves and cold waves	<ul style="list-style-type: none"> • Increase of occurrence of mortality due to due to extreme high and low air temperatures

Figure 3.5 Summary of climate change impacts on Montenegro’s public health sector
Sources: Second & Third National Communication on Climate Change

3.1.6 Urban areas

Podgorica’s Climate Change Adaptation Plan for Podgorica represents the country’s only comprehensive analysis of urban vulnerability of different groups and services to climate change. The vulnerability assessment identified that elderly and young, sick, outdoor workers as well as socially vulnerable groups (Roma, displaced persons) have high levels of vulnerability to heat waves (particularly in the city center where urban heat island effect is strongest) and intense rainfall with flash floods³³.

For urban services, social infrastructure facilities and electricity distribution systems are very vulnerable under all extreme weather events prompted by climate change. Water supply, drainage and sewerage systems and transport are specifically vulnerable to heavy rainfall and flooding³⁴. Further details of current and future vulnerabilities of urban areas to climate hazards is summarised in figure 3.6.

32 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

33 CCAP (2015). *Podgorica Climate Change Adaptation Plan – Vulnerability Assessment and Adaptation Action Plan. Capital City of Podgorica*, Montenegro: Secretariat for Spatial Planning and Environmental Protection. *Climate Change Adaptation in Western Balkans (CCAWB)*. Available at: [https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20\(2015\).pdf](https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20(2015).pdf)

34 CCAP (2015). *Podgorica Climate Change Adaptation Plan – Vulnerability Assessment and Adaptation Action Plan. Capital City of Podgorica*, Montenegro: Secretariat for Spatial Planning and Environmental Protection. *Climate Change Adaptation in Western Balkans (CCAWB)*. Available at: [https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20\(2015\).pdf](https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20(2015).pdf)

Climate hazards	Evidence of present vulnerabilities or impact	Most vulnerable and affected groups or zones	Future vulnerabilities or impacts from projections and scenario RCP8.5
Heat waves	Negative effects on human health; increased energy and water consumption; infrastructure	The elderly, pregnant women and children, and the very poor; agriculture, greenhouses due to high internal temperatures	Increased vulnerability of the population; effects on human health; changes in energy requirements
Drought	Decreased water availability, energy production, water supply	Poor part of the population, poorer area; areas with water shortages as a result of human activities; forest fires	Increase vulnerability of the population, additional investments for water supply
Extreme rains, flooding	More erosion, landslides; transport disruption	Infrastructure (transport, water supply, sewage system), agriculture, natural resources (water resources and quality)	More drainage infrastructure
Thunderstorms	Flood and wind victims; economic damages; damage to tourism and transport infrastructure; insurance	Coastal area, population and areas with limited capacities and resources; insurance companies	Increased vulnerability of storm-prone shores; possible impact on settlements, health, tourism, economy and transport;
Increase in mean temperature	Increased energy demand and costs (air conditioning), decreased air quality and tourism (in the long-term)	High vulnerability of the population with limited capacity and resources for adaptation	Changing energy demand; deterioration in air quality; impacts on settlements and infrastructure
Decrease in mean precipitation	Negative effects on urban agriculture, water infrastructure, energy supply (hydroelectricity)	Poor part of the population	Rainfall deficit; floods (increased extreme short-term rainfall)

Figure 3.6 Summary of climate change impacts or vulnerabilities in Montenegro's urban areas
Sources: Second & Third National Communication on Climate Change

The vulnerability assessment evidences that short-term heavy rains with sudden floods most affect urban areas with high levels of vulnerability for all urban services³⁵. The sewage and drainage systems have low adaptive capacity as they were not designed to withstand the recorded and projected increase in short-term heavy rains. Unplanned urban areas that lack green infrastructure and grey infrastructure to absorb and channel rainfall are particularly vulnerable to flooding³⁶. Again, more data is required on short-term rainfall to effectively inform planning and management activities for the adaptation of urban water management systems.

35 CCAP (2015). Podgorica Climate Change Adaptation Plan – *Vulnerability Assessment and Adaptation Action Plan. Capital City of Podgorica*, Montenegro: Secretariat for Spatial Planning and Environmental Protection. Climate Change Adaptation in Western Balkans (CCAWB). Available at: [https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20\(2015\).pdf](https://www.giz.de/en/downloads/Report%20%E2%80%93%20Vulnerability%20Assessment%20and%20Adaptation%20Action%20Plan%20for%20Podgorica%20Montenegro%20(2015).pdf)

36 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

4. Adaptation

WHAT ADAPTATIONS ARE NEEDED?

IN 2012 THE MONTENEGRO MINISTRY OF SUSTAINABLE DEVELOPMENT AND TOURISM, CARRIED OUT A TECHNOLOGY NEEDS ASSESSMENT FOR CLIMATE CHANGE MITIGATION AND ADAPTATION FOR MONTENEGRO, WHICH INCLUDED A NATIONAL STRATEGY AND ACTION PLAN. ADAPTATION MEASURES HAVE SUBSEQUENTLY BEEN LAID OUT IN THE NATIONAL COMMUNICATIONS TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE. THE INFORMATION IN THIS SECTION HAS BEEN DRAWN FROM THE WORK CARRIED OUT IN THE 2012 ASSESSMENT BY THE MINISTRY OF SUSTAINABLE DEVELOPMENT AND TOURISM³⁷, AND THE MOST RECENT (THIRD) NATIONAL COMMUNICATION (FINAL DRAFT FOR PUBLIC CONSULTATION)³⁸. ADDITIONAL INFORMATION CONCERNING CLIMATE ADAPTATION MEASURES THAT ARE NEEDED IN MONTENEGRO HAS BEEN COLLECTED FOR THIS REPORT DURING INTERVIEWS WITH THE KEY STAKEHOLDERS THAT ARE LISTED IN THE ANNEX.

4.1 Adaptation technologies and measures, described by sector.

4.1.1 Water

At a small scale, attention should be given to: rainwater harvesting; treatment of drinking water in households; and use of water efficient appliances. At a larger scale, attention is needed on: wastewater treatment and re-use; water losses management, discovering and repairing damages in water supply systems; flood hazard mapping; and flood warnings.

An integrated approach should be applied to water resources and systems management, in order to strengthen cross-sectoral planning and activities. Institutional and regulatory measures include improved coordination between the government, the Environment Protection Agency and the Institutes of Hydrometeorology and Seismology in order to ensure the development of a system of quality national water archives to store data and to make it readily available. Data set standards need to be harmonized; responsibilities and “ownership” needs to be defined with regard to specific data sets; and procedures defined for controlling data versions and managing data exchanges between institutions.

Multidisciplinary expert commissions need to be set up for the preparation of Watershed Protection Zone Projects, under the responsibility of the proper state institution. Harmonisation is needed for laws, regulations and guidelines on the protection measures that are relevant to the management of water resources. Clear and effective protocols for compliance must be defined for designated sanitary protection zones. And monitoring systems need to be put in place.

Technical measures include: strengthening the network of hydro-meteorological monitoring stations to provide sufficient climate information; upgrading the water and utility infrastructure and

37 MTNA (2012) Montenegro Ministry of Sustainable Development and Tourism, *Technology Needs Assessment for Climate Change Mitigation and Adaptation for Montenegro National Strategy and Action Plan*

38 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

construction of new facilities as needed, to increase water storage capacity. Ground water potential in and around Montenegro should be explored using GIS mapping, to determine the hydrogeological boundaries of ground water to meet demand under climate change. And new methodologies should be explored to reduce the vulnerability of watersheds to climate change.

Information and capacity building measures should involve strengthening the research and management capacities of key agencies to assess the occurrence and risk of adverse impacts of climate change on freshwater systems. The water information system should be upgraded, and options should be considered for the improvement of water management software information systems. Awareness raising with regard to the structure of the link between the underground drainage system and rainfall regime is necessary as an enabling factor to strengthen conservation measures and to improve the assessment of groundwater vulnerability. Additional investment is needed in: the improvement of wastewater and water distribution systems in urban areas; water-saving and -distribution measures linked to agriculture and forestry, such as irrigation, micro-reservoir development, and the development of wells and larger reservoirs. Further, hydroelectric facilities should be explored, albeit with sufficient attention to potential negative social and/or environmental consequences.

4.1.2 Coastal

Policy and institutional measures to increase the resilience of Montenegro's coastline in respect of climate change include: integration of climate change impact and risk assessment into all future coastal strategic documents; strengthening of cross-sectoral coordination at the coastal areas; improvement of the protection of areas that have the status of a special nature reserve; monitoring changes in coastal tourism, developing and implementing plans to adapt the tourism sector; promotion of new and sustainable tourism destinations and activities; and the introduction of regulations to restrict construction near shorelines.

Technical measures include: improvement and upgrading of early warning for coastal floods and storm surges; development and use of geographic information systems; promotion of erosion control measures such as dune regeneration and restoration of coastal areas; mapping of surfaces endangered by high waters, and analyzing options to better enable the hydrological service and the relevant municipal services to organise and monitor networks in priority watercourses. Further, communal infrastructure, such as treatment plants and pumping stations need to be moved to higher altitudes to reduce vulnerability to coastal flooding and erosion.

Flood barriers need to be constructed in order to protect critical infrastructures, including embankments and wave defences; early warning systems for coastal floods and storm surges need to be upgraded, along with the development and use of geographic information systems. Dune regeneration and restoration of coastal areas needs to be promoted in order to control erosion. Mapping of surfaces endangered by high waters is needed, as well as an analysis of options enabling the hydrological service and relevant municipal services to organise and monitor networks in priority watercourses.

Additional research is needed on the impacts of climate change on all sectors of the coastal zone, as well as the development of new impact models, analyses of high waters in watercourses in coastal regions, and assessment of erosion control options for the preservation of beaches.

4.1.3 Forests

Institutional and regulatory measures in respect of climate adaptation for the forestry sector need to focus on promoting sustainable management of forests, strengthening information and monitoring systems. Enhanced fire protection is also a priority, including improved fire risk preparedness and management. Further, there is a need for the establishment of cross-sector monitoring of the status of forest ecosystems. This includes the maintenance of sector databases, as a prerequisite for informed planning and implementation of adaptation measures.

Technical measures include: the improvement/update of early warning systems for fires and hydro-meteorological hazards; increasing species richness in forests and promoting mixed forest communities; promoting indigenous tree types for afforestation; encouragement of a mixed forest stand, with particular attention to the preservation of selected stands of beech, silver fir and spruce; the maintenance and increase of genetic variation within tree species; promotion of natural forest regeneration; avoidance of clear cutting; promoting of landscaping and protection of forests, and the production of seedlings.

Research, Information and capacity building measures should include: adequate reporting-forecasting services for forest protection; establishment of ecological indicators, indicating current changes in forest ecosystems; identification of species and provenance of forest trees that are genetically best adapted to the influence of climate change and are of economic significance; and support for cooperation for research and inter-institutional and international agencies; continuous learning and training for key officials; an integrated cross-sectoral approach to maintaining forest inventories, including sufficient information concerning the intensification of biotic and abiotic impacts caused by climate change; and participatory and adaptive planning of sustainable forest management in national parks.

4.1.4 Agriculture

Policy and institutional strengthening that is needed in the agricultural sector to reduce vulnerability includes: development of a comprehensive adaptation plan for droughts under conditions of increased climate variability and climate change, building on existing schemes for drought control measures; enhanced cooperation between decision makers, the scientific community, developers, investors and agricultural managers; and the establishment of a national network of reporters as part of agrometeorological observations, reporting on soil moisture and crop conditions. In addition, climate change impacts on land degradation should be addressed within Montenegro's Land Degradation Neutrality (LDN) Target Setting Programme.

Technical measures include: the expansion of a range of user-friendly agrometeorological information, such as satellite data and numerical model results; the improvement of the agro-forestry sector by raising new plantations of hazelnuts, wild pomegranates or other perennial species in areas exposed to frequent fires; building/upgrading of irrigation and drainage systems to ensure water access in drought periods; an analysis of the conditions needed to ensure access to fodder;

promotion of the sustainable use of mountain pastures and support for the sustainable use of manure; the construction of micro-reservoirs for use in respect of both fires and water shortages in livestock and crop production; implementation of models for simulating crop yields and predicting plant diseases in agro-meteorological operations; introduction of new varieties of agricultural crops that are more resistant to warmer climates and more frequent occurrence of extreme events; an assessment of the extent to which the use of biochar can increase resilience in the agricultural sector; and the establishment of a network of agrometeorological stations, equipped with sensors for soil temperature and humidity, leaf humidity and UV availability.

Research, information and capacity building measures include: the improvement of the phenological database, modernization of the data collection system to include integrated methods for online data input; systematic collection of existing data on soil organic carbon and other soil fertility parameters; an expansion of the network that observes and collects agricultural data; research on the impact of climate change on livestock breeding, and a determination of which regions are most suitable for various breeds and types of livestock; and the generation of agrometeorological information, including reporting on soil moisture and crop conditions.

4.1.5 Fisheries

Policy and institutional measures include: systematic gathering and processing of accumulated local ecological knowledge concerning marine ecosystems; establishment of a national monitoring center for alien and invasive species; adoption of a law on alien and invasive species, and design of plan of measures and activities to be implemented in the case of new species invasion. Technical measures should involve controlling the catch of species that are new to the Adriatic, which are drastically increasing in abundance. Capacity building is needed among officials and scientific institutions to enable local fishermen to enable the operation of fishing techniques that can target and decrease the population of invasive species. In conjunction with this, research is needed on opportunities to market new species; and awareness raising materials need to be prepared, with regard to specific species to be monitored and registered, and notification of authorities when new non indigenous species are discovered.

4.1.6 Public Health

Policy and institutional measures include the development of strategic documents related to climate change adaptation planning. These should aim to improve and strengthen the health system's ability to incorporate climate risks. Particular attention should be focused on potential negative health impacts associated with reduced access to safe drinking water, food and secure shelter, which are a possible result of climate change impacts.

Technical measures should include the development and improvement of bio-meteorological forecasting early warning and health monitoring systems for all health problems related to the potential impacts of climate change, particularly targeted towards the young, the old and people with chronic diseases.

4.1.7 Urban Areas

Policy and institutional strengthening measures include: developing cooperation between the three regions through the exchange of experience in implementing adaptation measures; and supporting local government in planning and implementing adaptation measures.

Technical measures include: improvement and development of infrastructure, above all drainage and sewerage systems; development of models and mechanisms for determining relevant characteristics of short-term rainfall for urban areas to support decision-making and planning of water management structures supporting urban services; and the promotion of green infrastructure to decrease exposure to heat waves and floods

Research, information and capacity needs include: an analysis of the quality of existing rainfall data, comparing estimates of expected short-term maxima from two shorter periods: 1961-1990. and 1991-2019; analysis of the precipitation regime of short-term heavy rainfall in pilot areas, selected by regional distribution, quality of available data and most commonly used for hydrological substrates in water abstraction calculations; selection of methodological procedures for a comprehensive analysis of short-term heavy rainfall, with focus on analysing climate change risks and impacts in the urban areas and considering the conditions for continuous checking and updating of key rainfall data; and guidelines on the use climate information such as projected short-term rainfall data.

4.1.8 Capacity Building

At all levels, there is a need to strengthen knowledge of climate change impacts, vulnerabilities and adaptations, and monitoring systems in respect of this, for all aspects of implementation of sectoral policies. Awareness raising is needed concerning the links between climate change and existing, and planned, programmes and activities. And increased clarity is needed in respect of the institutional and operational arrangements for the official working group on adaptation. Administrative and technical capacity for reporting to the UNFCCC needs to be increased.

Specific further measures that are needed, include: an increase in levels of information about sector specific climate impacts and their economic implications, including damage and loss analysis, especially at the local level; the creation of a focal person or department for climate change in each sector; learning programmes for key stakeholders on climate change fundamentals (the scientific basis; mitigation policies and actions; impacts, vulnerabilities and adaptation technologies and measures); clarify on the modalities for participatory decision-making and stakeholder input processes for managers and decision makers; a platform for information sharing; updating of vulnerability and risk assessments, and harmonization of these assessments across sectors; improved cross-sectoral collaboration on climate adaptation programming at national and sub-national levels; harmonization of techniques for climate related data collection, analysis, and documentation; improved collaboration mechanisms within and between sectors with respect to climate change, at all levels; the development of a university level climate related national curriculum, to increase and sustain professional inputs across all sectors; and improved availability of hydro-meteorological risk information, especially at the local level; and attention to measures to bridge language barriers, which are currently preventing staff access to relatively low-cost international knowledge and training.

5. Policies

5.1 Montenegro's official policies for climate change adaptation

Montenegro has been engaged officially with climate change policies and actions, at both the international and national levels, since 2006. This section describes the development of this process over time, leading up to the present situation, in which Montenegro is attempting to transpose EU climate rules into its domestic legislation, as part of the country's candidature for EU accession.

5.2 Climate change policies: 2006-2020

2006-7

Montenegro became a non-Annex-I party to the UN Framework Convention on Climate Change (UNFCCC) in 2006 and ratified the United Nations Framework Convention on Climate Change (UNFCCC) by succession in the same year, thus becoming a non-Annex-1 party to the Convention on 27 January 2007. The Kyoto Protocol was ratified on 27 March 2007, and Montenegro became a non-Annex-B party on 2 September 2007.

2013

Montenegro reformed its high-level multi-institutional council, strengthening its mandate in the field of climate change, as a strategic priority of the government towards the creation of a low-carbon society. The council had originally been formed in 2008, located within the Ministry of Sustainable Development and Tourism - the main national entity responsible for national environmental and climate-change policy and the National Focal Point to the UNFCCC.

2015

Montenegro submitted its INDC to the UNFCCC in September 2015, with a goal of a 30% GHG emission reduction by 2030; and became part of the Regional Implementation of Paris Agreement Project (RIPAP) which focuses on capacity building and support for participating countries for implementing the 2015 Paris Climate Agreement under the UNFCCC.

2016

The Government of Montenegro adopted the National Strategy with Action Plan for Transposition, Implementation and Enforcement of the EU acquis on Environment and Climate Change 2016-2020. This key strategic document articulated climate-change issues and introduced the concept of resource efficiency and the need for a circular economy (both of which are considered to be a significant contribution to the achievement of Montenegro's climate-change policy goals. The strategy laid out the necessary actions to meet the EU's climate-change requirements and the costs of full alignment with the EU's environmental and climate-change requirements. It also provided a baseline against which to determine progress. The objectives are grouped into the following priority areas: (1) better man-

agement of water resources and demand; (2) improved rational use of energy, increased use from renewable sources; (3) sustainable mobility through appropriate transport measures; (4) sustainable tourism as a leading economic sector; (5) sustainable agriculture and rural development; (6) sustainable urban development; and (7) sustainable management of marine, coastal and marina resources.

Further in 2016, the high-level multi-institutional council, created in 2008, and mandated to deal with climate change in 2013, became the National Council for Sustainable Development, Climate Change and Coastal Area Management (NCSDDCCAM).

2017

Montenegro adopted the Law on Ratification of the Paris Agreement on 11 October 2017, thus undertaking to contribute to GHG emissions reduction globally. Montenegro's contribution to international efforts to address climate change issues, expressed through the Intended Nationally Determined Contribution (INDC) to reductions in GHG emissions, is set at a minimum of 30% by 2030 compared to 1990 as the baseline year. This translates to a commitment to reduce GHG emissions by at least 1572 kt, to a level of not more than 3667 kt.

2019

In December 2019, in order to provide continuity and legitimacy to the efforts being developed within the framework of the national climate strategy and to ensure long-term commitments, a binding legislative framework was put in place in the form of the Law on Protection against Climate Change. The objective of this law is protection against adverse effects of climate change, reduction of greenhouse gas emissions, and protection of the ozone layer. Specific measures in respect of adaptation are included in Article 9 as follows:

1. Description of the current situation caused by climate change
2. Identification of vulnerable sectors
3. Analysis of the social and economic situation affecting climate change
4. Analysis of observed climate change and extreme climate conditions
5. Overview of expected climate change with an assessment of key risks
6. Climate change impact analysis
7. Main objectives of climate change adaptation
8. Description of the institutional framework for climate change adaptation
9. Overview of existing plans and strategic documents in the field of climate change adaptation with an assessment of progress in implementation and examples of good practice

10. Assessment of climate change adaptation capacities
11. Climate change adaptation measures
12. Measures to be implemented as priority ones with persons responsible for their implementation
13. Description of mechanisms and framework for monitoring and evaluation of the Adaptation Plan implementation
14. Assessment of financial resources for implementation of measures.

In addition, Article 10 of the Law on Protection against Climate Change decrees that: “the state administration authorities responsible for energy, industry, agriculture, forestry and transport shall deliver to the Ministry a biannual report on measures implemented in line with the strategic documents, aimed at preventing adverse impacts of climate change, as well as data on floods, droughts, extreme temperatures, etc.”

Further, in 2019, Montenegro adopted a Smart Specialization Strategy (2019–2023). This is a national innovation strategy that sets out development priorities, aiming to build a competitive advantage by connecting strengths in research and innovation with the needs of the economy, responding coherently to growing opportunities and market development, and attempting to avoid overlapping and fragmenting policies. The strategic priorities are:

- energy and sustainable environment
- sustainable agriculture and food value chain
- sustainable and health tourism
- ICT (information and communication technologies).

2020

In 2020, at the time of writing, Montenegro has published a public consultation draft of its third National Communication to the UNFCCC, which summarizes the efforts made in the country related to climate change management since the presentation of the second National Communication in 2015. The Communication has been produced under the leadership and coordination of the Ministry of Sustainable Development and Tourism with financial support from the Global Environment Facility and technical support from the United Nations Development Programme.

The Communication includes an update of the 2010 greenhouse gas (GHG) emissions inventories and the results of the new GHG inventories for 2017, as well as a general description of the measures formulated, adopted and implemented by Montenegro for the management and planning of GHG emissions reductions. It also presents the climate profile of the country, highlighting the sectors and regions most vulnerable to climate change impacts, while providing analysis of potential adaptation measures. The report summarizes information on processes related to capacity building at the national level and the promotion of investments and financing mechanisms in the country, among other relevant issues.

Montenegro has been granted significant capacity-building and technical assistance for a number of climate change related programmes, projects and partnerships by a range of multilateral and bilateral donors, including: the European Commission, UNDP and other UN agencies, the World Bank, EBRD, GEF, GCF, GiZ, EIB, KfW, LuxDev, ADA, the Governments of Italy, Germany, Luxemburg,

Austria, Norway, the Netherlands and Greece. The largest share of financial and technical assistance has been provided by UN agencies and the European Commission, who have supported projects, workshops, studies and capacity building initiatives.

The responsibility for engaging relevant ministries across sectors and in the coordination of climate policy lies with the Ministry of Sustainable Development and Tourism's (MSDT) Directorate for Climate Change (DCC).

Most of the attention has gone to climate change mitigation, primarily focused on achieving national climate change targets of a 30% GHG reduction by 2030. This is due on part to the fact that Montenegro is a candidate country for EU accession, and has undertaken to transpose the EU climate and energy package into domestic legislation. This has included becoming a party to the treaty establishing the so-called Energy Community (EnCT), which is being undertaking to rapidly endorse EU rules on the monitoring, reporting and inventorying of greenhouse gases and the actions undertaken to address climate change, and to develop an integrated National Energy and Climate Plan (NECP) in line with European Commission (EC) proposals. As part of this effort, the Government of Montenegro issued a new Decree on Issued Activities for GHG Emissions on 6 February 2020, which entered into force on 21 February 2020. This brought Montenegro closer to the EU climate change acquis, since adoption of this regulation was one of the preconditions for negotiations under Chapter 27 Environment and Climate Change in the EU accession process.

All of this activity on climate mitigation is of course laudable. However, work on climate adaptation in Montenegro is receiving much less attention. And although there has been clarity on adaptation actions since at least 2012, when an adaptation assessment was carried out by the Ministry of Sustainable Development and Tourism (MTNA 2012), work in this area to date has been confined to gathering information on adaptation actions - *together with information on mitigation* - into a structured form that could be used for stakeholder engagement and reporting, including the creation of an MRV data sharing portal that could be used to consolidate information, structure collected data and support the retention of institutional memory.

6. Barriers

BARRIERS TO IMPLEMENTATION

THIS SECTION DRAWS FROM INTERVIEWS WITH KEY STAKEHOLDERS IN MONTENEGRO, WHICH TOOK PLACE DURING THE FIRST HALF OF 2020. FOR THE FULL LIST OF PERSONS INTERVIEWED PLEASE SEE THE INFORMATION CONTAINED IN ANNEX A: KEY STAKEHOLDERS.

Climate policies may be produced, sometimes to a very high standard. But such policies may be only partially or selectively implemented: or even not implemented at all. Any gaps in implementation are due to a range of possible political, economic, social and/or cultural barriers, all of which fall under the concept of *governance*.

The extent to which there is a good standard of climate governance determines the extent to which climate policies will be implemented. And it follows that, in order to raise the standard of climate governance, barriers to implementation need to be removed.

For this report, the scope of possible barriers to the implementation of climate policies in Montenegro was limited to the following six key criteria: participation; accountability; transparency; integrity; coherence; and knowledge. These six criteria follow a set of key governance criteria for climate change, that were selected during a scoping exercise that was carried out by Transparency International, under a work programme on climate governance financed by the German Federal Ministry for the Environment³⁹.

Participation refers to the extent to which civil society organizations, the private sector and other non-governmental agencies are able to meaningfully take part in decision making. Accountability refers to the extent to which officials are held responsible for their decisions. Transparency refers to the extent to which relevant information is made freely and easily available, in a timely manner. Integrity refers to the extent to which administrative and democratic checks and balances are in place that effectively counter fraud and corruption. Coherence refers to the extent to which climate policies and strategies, and other major strategies for national and/or sectoral economic development are consistent with each other. Knowledge (in the context of this report) refers to the extent to which key stakeholders (in government, civil society and the private sector) are sufficiently knowledgeable in respect of: the scientific basis of climate change; climate mitigation technologies and options; and especially climate impacts, vulnerability and adaptation.

The following is an overview of the responses to questions that were posed to key stakeholders. A range of responses were given and an attempt has been made to present a fair and balanced overview of stakeholder's views. However, it is important to note that not all stakeholders agreed completely on every point.

³⁹ Transparency International (2018) *Climate Adaptation Finance Governance Standards*. Available at <https://www.transparency.org/en/publications/climate-adaptation-finance-governance-standards#>

6.1 Participation

6.1.1 Question to stakeholders

Are there sufficient possibilities for the meaningful participation of civil society and the private sector in official strategies and investments related to adaptation?

6.1.2 Response from stakeholders

Montenegro has a system in place for public participation. Every law and other strategic act is made public by the government ministries and agencies that are responsible for initiating and coordinating their respective plans and programmes. For key acts, working groups are set up and civil society stakeholders are invited to participate. Documents are circulated online, public hearings take place, workshops are held and in this manner conditions for public participation in respect of EU requirements appear to be met.

On the other hand, there is a perception among most stakeholders that, generally speaking, suggestions and input provided by civil society does not lead to any significant changes in government strategies nor operations. Suggestions from NGOs, in particular, may be ignored without reason, or forcefully rejected without substantial counter-arguments. Also, the private sector does not appear to be actively involved in government participatory exercises. And no examples seem to be available of measures suggested by civil society during a participative process in Montenegro that have led to a significant change in, or rethinking of, government strategies, policies or investments.

In respect of climate change adaptation, this appears to be complicated further by a gap in capacity in Montenegro's civil society with regard to technical understanding, knowledge and expertise of the extent to which Montenegro is vulnerable to climate impacts.

6.2 Accountability

6.2.1 Question to stakeholders

Are government agencies sufficiently accountable with respect to the implementation of adaptation strategies? And if any such barriers to implementation exist, then how can they best be removed?

6.2.2 Response from stakeholders

Responses to this question relate closely to the question on participation above. There is general agreement that Montenegro has a strong network of competent NGOs that are very actively attempting to hold the government accountable in respect of agreed strategies and policies on climate change. And it is also generally agreed that the government is making strategic and policy

documents available in a timely manner. On the other hand, stakeholders also stated that it is not possible to effectively hold government officials accountable for mistakes if and when these are made.

6.3 Transparency

6.3.1 Question to stakeholders

Is there sufficient transparency with respect to decision making and financial management in respect of adaptation?

6.3.2 Response from stakeholders

Responses to this question were similar to those for transparency and accountability above. High level government policies and strategies are available for scrutiny and can be obtained freely online. However, more detailed information regarding the workings of government agencies - including disclosure of financial spending - does not appear to be easily available.

6.4 Integrity

6.4.1 Question to stakeholders

Are there sufficient checks and balances in place to ensure integrity in decision making and financial management in respect of adaptation?

6.4.2 Response from stakeholders

There were few facts provided by stakeholders with respect to the issue of integrity, and no specific examples of corruption in respect of climate change adaptation were provided. However, it was mentioned that it is possible to assert that there is a relatively high level of corruption in Montenegro, considering the fact that such an assertion can be backed up by credible international institutions. This point is discussed in more detail in the conclusion section of this report.

6.5 Coherence

6.5.1 Question to stakeholders

Are officially accepted adaptation strategies coherent with other key official economic development strategies, plans and/or investments?

6.5.2 Response from stakeholders

Stakeholders expressed opposing responses to this question.

It was expressed that Montenegro's government response is coherent with regard to climate change adaptation: adaptation measures have been included in many documents, different ministries are involved, the national climate strategy is in line with economic policy, and actions are being based on scientific evidence.

However, it was also expressed that economic predictions are not aligned with climate change and no calculations are being made of the economic costs of climate change. Further, it was explained that there are no cost analyses being carried out into the costs and benefits of transitioning into a low carbon economy; and large scale plans for construction do not appear to be in line with low carbon ambitions, with particular concern expressed for developments in the tourism sector, where investments in ski resorts have been questioned in view of climate change. Also, concerns were raised concerning the way in which details of climate impacts that are contained in Montenegro's National Communications to the UNFCCC are not being taken up in sectoral development plans.

6.6 Knowledge

6.6.1 Question to stakeholders

Is their sufficient knowledge about climate impacts, vulnerability and adaptation among key stakeholders?

6.6.2 Response from stakeholders

All stakeholders expressed concerns in respect of a general lack of capacity within government agencies in Montenegro to effectively study climate impacts, assess vulnerabilities and assign priorities for adaptation. Montenegro is highly dependent on external/international experts for the preparation of studies and reports in respect of climate adaptation.

This is due to limited technical capacity at the ministerial and sectorial levels; and there seems to be insufficient number of government officials that have sufficient training to be able to express themselves within the framework of climate change adaptation.

There is a solid base of a small number of good professionals working on climate change within the government. However, continuous support and training, and more staff hires, are needed in respect of climate change adaptation expertise, to provide a more optimal solution.

This may be due in part to the relatively low salaries paid to civil servants in the public sector. Stakeholders mentioned that more qualified government staff tend to move towards jobs with NGOs or in the private sector.

7. Conclusions

7.1 Conclusions and Final Remarks

Montenegro is vulnerable to climate change and increased climate variability, including extreme events. The most vulnerable sectors are water, forestry and agriculture. And the entire coastal area is vulnerable to sea level rise. To build its capacity to respond, Montenegro has received financial and technical support from a range of bilateral and international channels. This has been in the form of knowledge transfer programmes, combined with loans and grants. Over €200 million was received in Overseas Development Assistance between 2014 and 2017. However, the majority of support and investments have been in climate mitigation: there have been much fewer investments and support for climate adaptation⁴⁰.

This is also reflected in the overall policy response to climate adaptation. For example, although Montenegro's national sustainable development strategy 2030 prioritises actions in the water-, public health-, agriculture- and tourism-sectors, the strategy for climate change only focuses on mitigation measures⁴¹.

This focus on mitigation is partly due to the fact that Montenegro is the process of acceding to the European Union, which requires the country to harmonize its policies in particular with EU legislative framework on climate change, which focuses largely on actions in the energy sector. Despite this, however, according to the European Union, climate change adaptation is taking place across the European Union in a fragmented and uncoordinated way. And there needs to be a more strategic approach to make sure that different economic sectors line up their approaches, in order to facilitate effective adaptation actions to take place quickly⁴².

This is also true for Montenegro: in respect of climate adaptation, there is not enough exchange of information between stakeholders within key institutions; no expert advisory body to give guidance on how Montenegro's economic sectors and geographic areas are vulnerable; a lack of systematic cooperation between research institutions and key decision-makers; a gap in funding for climate vulnerability and adaptation research; and insufficient support for the creation of expert and advisory bodies at all levels, working in the field of climate resilience⁴³.

As laid out in the section on policies earlier in this report, a large body of guidance and environmental legislation has been produced on climate change in Montenegro. The country ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 2006 and - especially over the past five years, since 2015 - there has been an acceleration in the production of climate change policies. These concentrate primarily on climate mitigation but nevertheless there are very clear guidelines in place regarding how Montenegro should respond. And in 2019 a Law on Protection against Climate Change was passed, which includes clear measures in respect of climate adaptation, which state that the government should: systematically observe climate changes and extreme conditions; increase understanding of the current biophysical, social and economic situation caused by climate change; identify the most vulnerable sectors, expected changes and key

40 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

41 MSDT (2016b) *National Strategy for Sustainable Development until 2030*

42 European Commission (2019) *Montenegro 2019 Report*, Brussels

43 MTNC (2020). *Montenegro Third National Communication on Climate Change to United Nations Framework Convention on Climate Change*. Final draft for public consultation, English version.

risks; lay out key adaptation objectives; assess climate adaptation capacities; determine priority measures, and assign responsibilities for operationalizing them; and assess financial resources needed for implementation.

Nevertheless, financial investments are not being aligned with Montenegro's legal framework with regard to climate adaptation. As an illustration of this, stakeholders interviewed for this report pointed to a current Government of Montenegro investment, through the Public Works Directorate, of 140 million Euro until 2023, for new ski resorts including roads, hotel buildings, artificial lakes, ski lifts and other infrastructure.

The long-term viability of this investment has been questioned. Warnings concerning the risks of climate change to Montenegro's ski resorts and winter tourism industry were made by the United Nations Development Programme in an assessment of the economic impacts of climate change on the Montenegro economy already ten years ago⁴⁴. And this warning has subsequently been reinforced by the most recent scientific evidence as reported by the Intergovernmental Panel on Climate Change in its recent on the ocean and cryosphere in a changing climate, which states that:

"Tourism and recreation activities such as skiing, glacier tourism and mountaineering have been negatively impacted by declining snow cover, glaciers and permafrost (medium confidence). In several regions, worsening route safety has reduced mountaineering opportunities (medium confidence). Variability and decline in natural snow cover have compromised the operation of low-elevation ski resorts (high confidence)"⁴⁵.

The Government of Montenegro has defended the investment, stating that the aim of the scheme is to improve the living conditions of the population of Montenegro by boosting the tourism sector, which will lead to job creation. And the government plans to ameliorate the risk of lost revenue due to low or zero snowfall by investing in snow-making systems. However, there has been no vulnerability assessment carried out to determine whether this will be sufficient to secure the long-term economic sustainability of the scheme, in the context of decreasing levels of snowfall over the coming decades, caused by climate change.

The rift between the large amount of sophisticated climate change policy documents on the one hand, and the lack of attention to climate change in economic development planning on the other hand, indicates that there are gaps in governance in the political and economic system in Montenegro. In respect of climate action, as described in the section on barriers, above, stakeholders have raised concerns with respect to the extent to which it is possible for civil society to meaningfully participate in government strategy and planning decisions. These concerns have been laid out clearly in reports from international NGOs^{46 47}.

44 UNDP (2010), *The Economic Impacts of Climate Change in Montenegro*

45 IPCC (2019) *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*

46 Amnesty International (2020), *Montenegro Report* (accessed 15 July 2020: <https://www.amnesty.org/en/countries/europe-and-central-asia/montenegro/report-montenegro/>)

47 Transparency International (2019), *Montenegro – widely condemned law does not deserve a second chance* (accessed 16 July 2020: <https://www.transparency.org/en/press/montenegro-widely-condemned-law-does-not-deserve-a-second-chance>)

Also, the European Commission has raised strong concerns, and in its 2019 report on Montenegro, in the context of the country's accession talks for EU membership, the Commission stated that:

The inclusion of civil society organizations (CSOs) "is deficient and uneven in practice, varying from one working group to another. Often, CSOs are not given sufficient information or notice to be able to contribute meaningfully to the process, or their contributions are ignored. Consultation practices require better planning, transparency and openness to CSOs' suggestions to make them genuinely inclusive. Cooperation between civil society and local government is yet to be developed."

And further: "The growing trend of public institutions declaring information classified needs to be reversed as a matter of priority as it prevents effective oversight by civil society."⁴⁸

Clearly, this is an issue that needs to be solved if the government of Montenegro is to base its national multisectoral climate change adaptation strategy on evidenced-based decision-making, in order to protect its population from the impacts of increased climate variability and climate change.

48 European Commission (2019) *Montenegro 2019 Report*, Brussels

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Annex

Stakeholders Interviewed

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Milica Mudresa: Montenegro Ministry of Sustainable Development and Tourism

Marina Markovic: Independent Expert

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