Nexus Mapping Study for South-East Europe: Report for Montenegro

Background Study for the SEE2020 Region Nexus Policy Dialogue Process

December 2018

Global Water Partnership Mediterranean

gef IW LEARN

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Umwelt Bundesamt

Austrian Development Agency

Background

The Study was prepared in the framework of the following projects:

i. "*Water-Food-Energy-Environment Nexus Policy Dialogue Process in South East Europe*" funded through the Advisory Assistance Programme of the German Environment Agency in cooperation with the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety;
ii. GEF IW:LEARN Activity 2.3: *Supporting Regional Cooperation on Shared Water Resources through Dialogue*, and
iii. "*Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of the Nexus approach*" funded by the Austrian Development Agency.

The Study was drafted by "Fresh-thoughts Consulting GmbH" contracted by GWP-Med, with contributions by GWP-Med staff members. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of GWP-Med or the donor organisations.

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Table 1: Version history

Version	Date	Changes included	Goes to
0a	16 May 2018	First draft	FT
0b	17 May 2018	Second draft	FT
0c	18 May 2018	Third draft	FT
Mbl	23 May 2018	English checked	FT-GUS
1a	13 June 2018	Final draft, including summary	GWP-Med
1a-13123018	16 Dec 2018	Revised draft	FT
1b	16 Dec 2018	QA final version	GWP-Med

1. Introduction

This Economy Report focuses on Montenegro, as a part of SEE2020 Region (including Albania, Bosnia and Herzegovina, The Former Yugoslav Republic of Macedonia, Kosovo*, and Serbia, within its wider geographic context). It is aimed as the conceptual and technical background to support and inform the Nexus Policy Dialogue process, ongoing since 2013 in SEE under the 'Petersberg Phase II / Athens Declaration Process' and Global Environment Facility's (GEF) programme "International Waters: Learning Exchange and Resources Network" (IW:LEARN) in cooperation with the Regional Cooperation Council (RCC).

The table 1. Represents an overview on the key Nexus sectors in Montenegro.

Key Nexus Sectors	Montenegro
Size (km^2)	13,812
Population (million inhabitants)	0.6
Economic growth (NomGDP EUR/capita)	6357
Water renewable resources (million m^3/yr)	19,700
Water abstractions (million m^3/yr)	161
Energy production (Mtoe/yr)	0.7
Energy imports (Mtoe/yr)	0.3
Energy efficiency (Mtoe/yr/capita)	3.8
Agricultural land (% of total)	38
Forest land (% of total)	40
Protected areas (% of total)	6.40

Table: Overview on key Nexus sectors in Montenegrin economy[i].

1.1. Purpose of the study – Context

This Nexus Assessment is prepared in the framework of the following projects:

- "Water-Food-Energy-Environment Nexus Policy Dialogue Process in South East Europe" funded through the Advisory Assistance Programme of the German Environment Agency in cooperation with the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.
- GEF IW:LEARN Activity 2.3: Supporting Regional Cooperation on Shared Water Resources through Dialogue
- "Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of the Nexus approach" funded by the Austrian Development Agency.

This Study will be used as the conceptual and technical background to support and inform the activities of the three Projects above as well as the Nexus Policy Dialogue process, who have the following objectives:

- Supporting the discussion for the preparation of a regional water, food, energy, environment Nexus Strategy/Roadmap under the SEE2020, describing steps and actions for the introduction of Nexus approach considerations in the basin/aquifer management frameworks at national and transboundary levels as means towards sustainable management of water, land, energy and environment.
- Facilitation of the discussions among the SEE2020 economies for the possibility of a Regional Integral Water Management Framework Agreement (RIWMFA) comprising among others of regional means and tools to assist in addressing challenges related to transboundary water resources management (TWRM).
- Fostering cross-fertilisation of institutions and practitioners at regional and national levels.

The specific objectives of the Study are the following:

- Identification of the level of integration of management of natural resources related to Nexus (i.e. water, energy, food and ecosystems).
- Identification of interlinkages and potential benefits, trade-offs and conflicts among Nexus sectors (water, energy, food and ecosystems).
- Brief assessment of the level and status of cooperation for the management of transboundary basins in the SEE2020 region.

The study focuses SEE2020 Region, including Albania, Bosnia and Herzegovina, The Former Yugoslav Republic of Macedonia, Kosovo[1], Montenegro and Serbia, within the wider geographic context.

1.2. Methodology for the development of the study

The overall work is divided in four main tasks, which have been developed in a sequenced way, certainly overlapping in time, between 2017 and 2018. They are indicated in the following schema:

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence

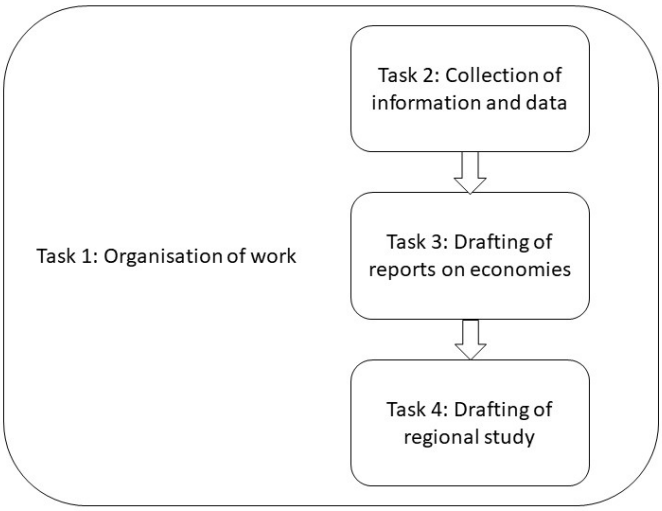


Figure 1: Schema of work developed for the study.

Based on the objectives established, data and information were gathered, which was carried out both at the regional level and at the level of the economies. The study includes in the Annex a list of literature, information sources, datasets and interviews.

Desk research and interviews were carried to find documents, databases and other relevant information sources on the economy of Montenegro. The sources used are listed in the Annex.

2. Nexus Assessment in Montenegro

2.1. Key data and trends

The total size of Montenegro is 16,352 km^2, of which the surface area is 13,812 km^2 and the sea surface area about 2,540 km^2. The total length of the economy's borders is 614 ; the Adriatic coastline is 293 km long.

90% of the mountains are higher than 200 meters above sea level. As such, the economy is characterized as a small mountainous state on the southwest Balkan with high altitude mountains and deep valleys.

Montenegro borders Croatia to the west, Bosnia and Herzegovina to the west/northwest, Serbia and Kosovo* to the north and northeast and Albania to the east/southeast; .

Figure 2. Physical (left) and political (right) map of Montenegro

Administratively, the economy is divided into 23 municipalities (figure 2). According to the MONSTAT[2], the estimated population in mid-2016 was 622,303, a 0.35% of changes from 2003. The population density is 45.1 inhabitants per km^2. 63.23% of the total population lives in urban areas and 36.77% in rural areas.

Figure 3. Municipalities with largest cities and towns

Economy size of Montenegro	Sq.km	13,812

[2] MONSTAT – Statistical Office of Montenegro

Nominal GDP for year 2016 (latest available)	Mio. EUR (current)	3954
Key economic sectors by share of DGP (latest available)	% share	Agriculture,F orestry and Fisheries, 7.5;Whole sale and retail,12.2;Accommodation services and meals,7.1;State administration and defense, compulsory social security,7.4;Real estate business,6;Information and communications,3.9;
Population size (latest available)	Number	622,303

Table2. Key socio-economic data[ii].

The internal migration from the northern municipalities to the central and southern parts of Montenegro has been increasing. According to the data, 5,237 inhabitants moved within Montenegrin borders in 2017. About 52% of the inhabitants moving are women. Women between the ages of 15 and 34 ages move more than men with the same ages, especially in age group from the 25 to the 29. In all other groups, more men than women change their residential place.

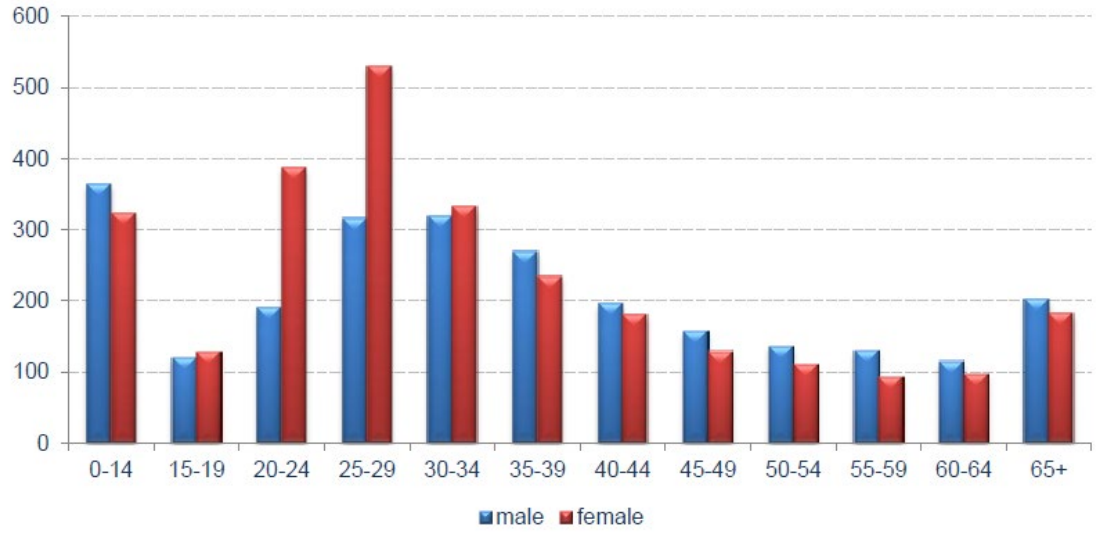


Figure 4: Internal migration by age and sex (Source: MONSTAT, Department of demography and census of population, https://www.monstat.org/userfiles/file/demografija/migracije/2017/Migracije%20unutar%20Crne%20Gore%20u%202017_%20godini%20-%20eng.pdf

In 2017 positive net migration was recorded in 11 municipalities. The highest difference between those who moved in and moved out is in Podgorica, while the highest negative net is in Bijelo Polje.

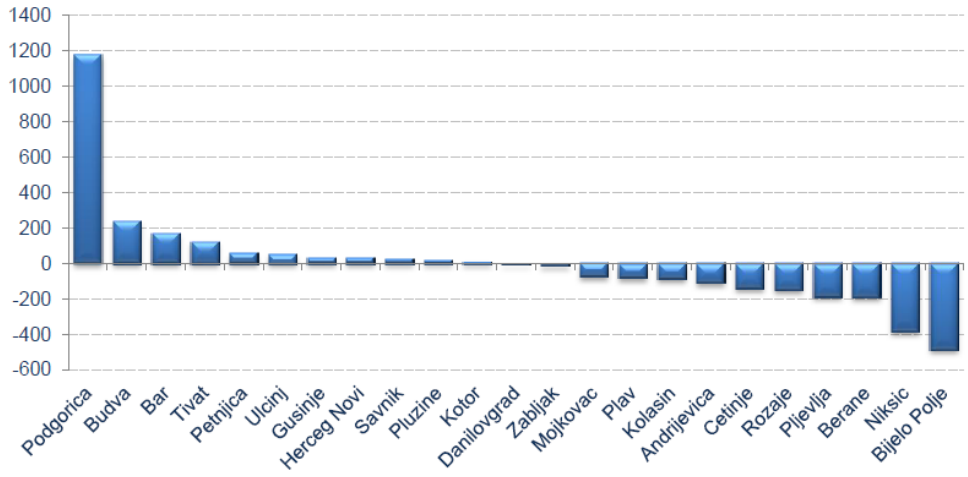


Figure 5: Net migration by municipalities

The net migration is negative in the northern region of Montenegro (1268 persons), while positive net migration is recorded in central and then in coastal region.

2.2. The economy

In 2016 the gross domestic product (GDP) was about €3.954 billion (approx. €6,439 per capita). The Montenegrin economy falls into the category of small economic systems and into the group of economies with medium revenues. Nominal growth of GDP was very high during the period 2006–2008 (for example, 23.9% in 2007 and 15.4% in 2008). The economic crisis caused a significant decline of -3.5 % in economic activity in 2009. Over the past two years, the economy has emerged from the recession and nominal GDP growth was 8.2% in 2016.

Gross income of Montenegro in 2016 was €4.007 billion, which is 6.9% higher in nominal terms compared to 2015. Gross income per capita in 2016 was €6,439 (source: MONSTAT).

The overall economic development of Montenegro shows a steady increase since 2003 in terms of nominal GDP and nominal GDP/inhabitant between 2008 and 2012.

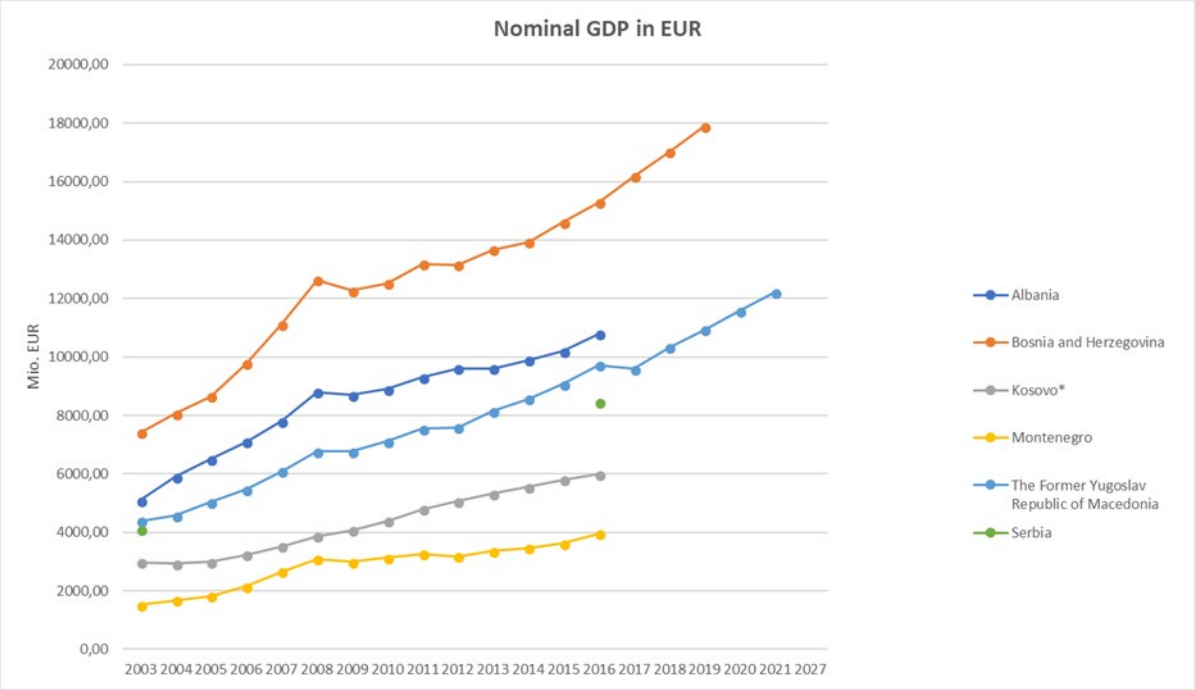


Figure 1 Evolution of Nominal GDP (in EUR)[iii].

Key economic sectors by share of GDP in 2016 are: whole sale and retail trade 12.2%; state administration and defence, compulsory social security 7.4%; hospitality services and restaurant services 7.1%; real estate business 6%; construction 5.6%, and information and communications 3.9%. Industrial production (mining, manufacturing and energy generation) accounted for about 8.4% and agriculture and forestry 7.5%.

The absolute poverty line for Montenegro in 2013 was €186.45 per equivalent adult, which is approximately €4 more than in 2012. The number of inhabitants living in poverty decreased from 11.3% in 2012 to 8.6% in 2013.

In 2013 poverty decreased in urban and in rural areas. In urban areas, the poverty rate was 7.9 % in 2013, while in 2012 it was 8.1% (Table 2). In rural areas the poverty rate was 9.7% in 2013, while in 2012 it was 18.1%.

The rural population has much higher poverty risk in comparison with the urban population. The poverty gap and severity is higher in urban areas.

	Poverty rate			**Poverty gap**			**Poverty sevirity**		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Urban areas	4.4	8.1	7.9	1.0	2.7	2.9	0.4	1.6	1.5
Rural areas	18.4	18.1	9.7	3.8	3.1	1.5	1.1	0.9	0.4

Table 3.Poverty according to location, 2011-2013 (%)

Source: Monstat,Department for labour market, living conditions, social services and household consumption

There are significant differences in the extent of poverty in the region between the north and other parts of the economy. Table 5 shows that the poverty rate in the northern region is almost three times higher than poverty rate in southern region.

Regions	Povety rate	Relative poverty risk	Share of the poor	Share of total population
North	10.3%	1.20	30.1%	25.0%
Center	10.3%	1.20	58.1%	48.3%
South	3.8%	0.44	11.8%	26.6%

Table 4: Poverty estimation by geographic areas[iv]

Regular wages reduce poverty risk. In 2013 the lowest poverty rate was in households whose main source of income was agriculture and business (4.4%) and is slightly greater in households which main source of income are wages from the private sector (Table...).

There are two important sources of energy in Montenegro - hydro-power and coal. The estimated overall hydro-power potential is 10.6-10.7 TWh, of which 9.846 TWh is from the main watercourses and 0.8-1 TWh is from small watercourses. The estimated overall technical hydropower potential is 4.1-5 TWh, with 3.7-4.6 TWh from the main watercourses and 0.4 TWh from the small watercourses.

Coal is extracted in the area surrounding Pljevlja and Berane. There are three coal mines in Pljevlja: Pljevljamine, Ljuće-Šumani and Maoče mine. The estimated total reserves in Pljevlja are 184.5 million tons.

The 2014 Montenegrin Energy Development Strategy estimates that by 2030 up to 7 billion barrels of oil and 425 billion cubic meters of natural gas could be discovered along the coast. Further research regarding these resources is necessary to confirm the capacity levels.

Mineral production is expected to remain modest, and the structure of the mineral industry is not expected to change significantly in the near future. The Government is expected to continue to encourage companies to explore the area of the southern Adriatic due to the natural gas and petroleum potential (https://minerals.usgs.gov/minerals/pubs/country/2012/myb3-2012-mj.pdf).

Key branches of industrial production in Montenegro include the production of electricity, mining and the metal industry. The most important branches of the metal industry are the production of aluminium and steel. Economic development in Montenegro until 1990 was characterized by intensive industrial production, and the industry's share in the gross domestic product was about 30% until 1991. Since that time, there has been a continuous decline in industrial production and in 2011 the level of manufacturing as represented in GDP was only about 5%.

Of the total area, agricultural land in Montenegro accounts for 22.3% (309,240.7 hectares - 0.5 ha per capita), which is an important resource for development. Of this,

total agricultural utilised arable land in 2014 covers 230,3 ha (0.37 ha per capita). In Montenegro, a total of 48,870 agricultural holdings are registered, of which 48,824 family farms.

The structure of the utilized agricultural land in the highest degree is represented by meadows and pastures (941%). Area of utilized agricultural land of family farms makes 68.8% (212,724.4 ha) of the total available land, with an average area of utilized agricultural land per family farm of 4.48. (Source: program for food production and rural development - 2009–2013, Ministry of Agriculture, Forestry and Water Management, 2008.

The importance of agriculture and rural development is that in this sector 98.949 working persons are engaged. Therefore this sector is recognized as an important one.

The employment rate is slowly increasing in Montenegro and have higher rates than the other economies.

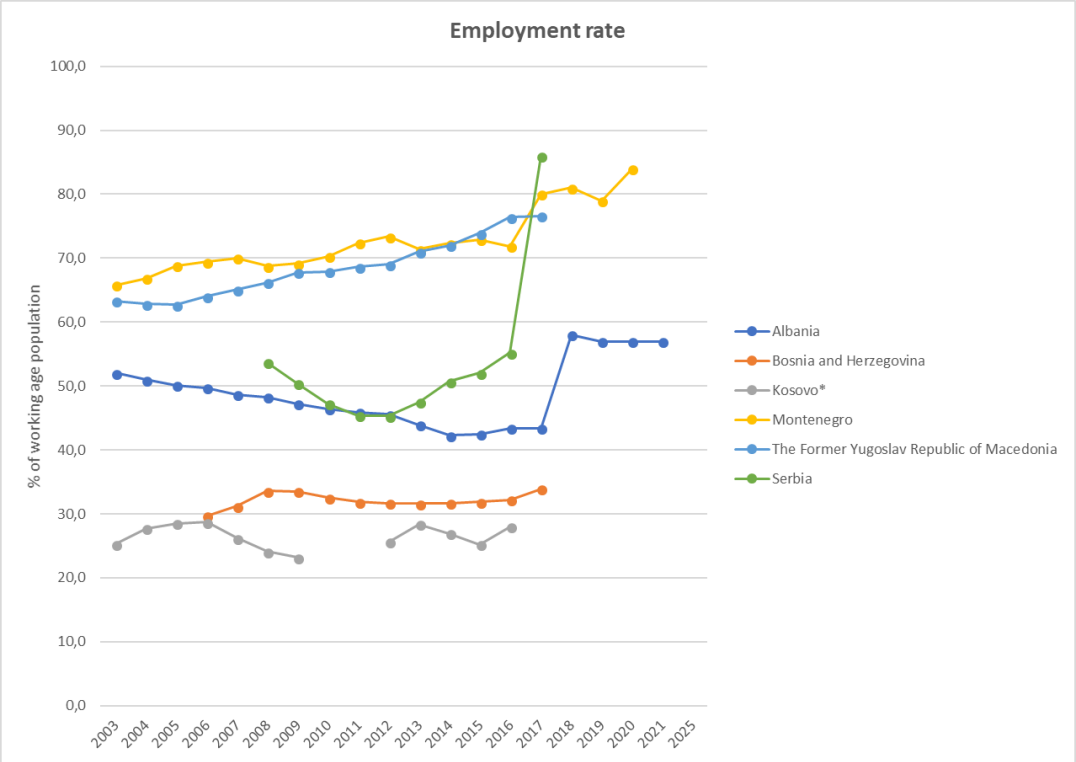


Figure 5: Employment rate[v].

The Gini index show slightly improvements over the past years.

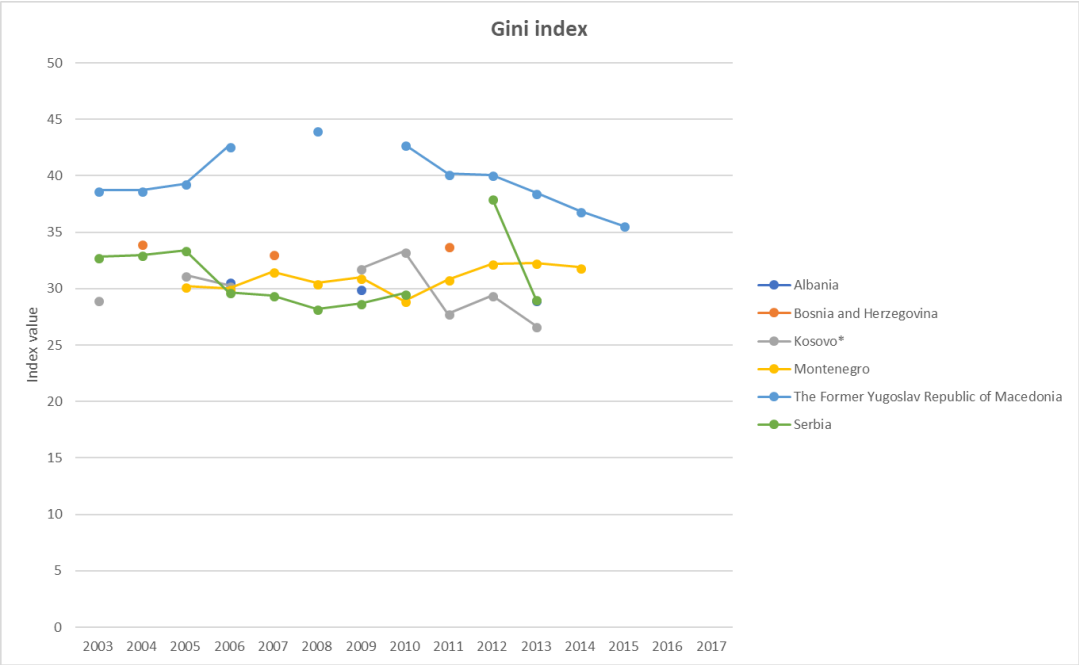


Figure 6: Gini Index[vi].

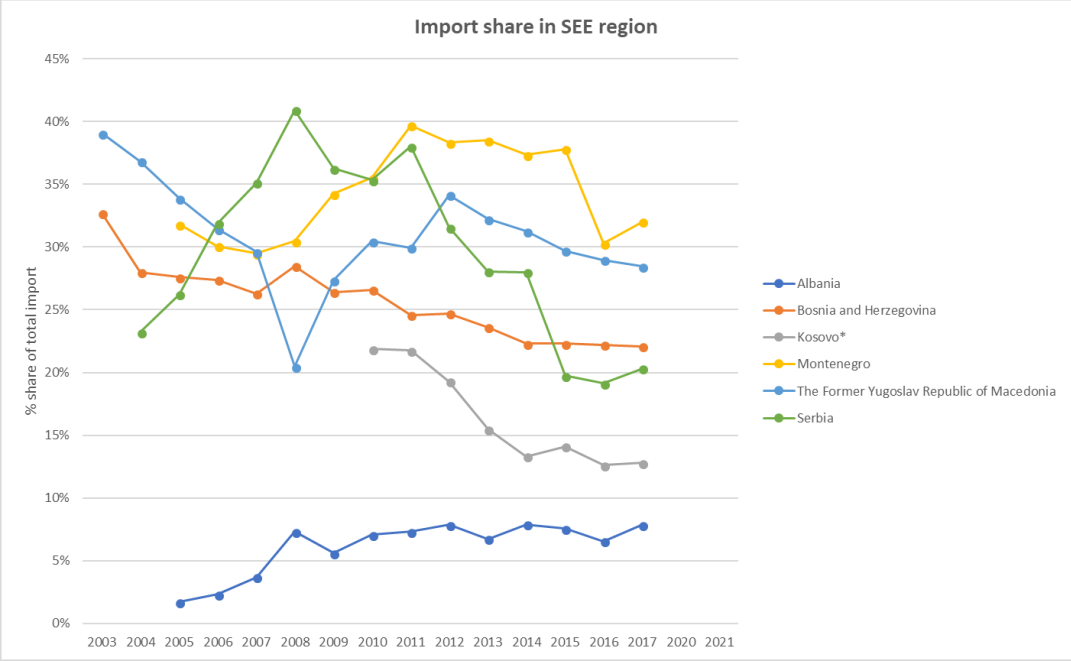


Figure 7: Import share SEE region[vii].

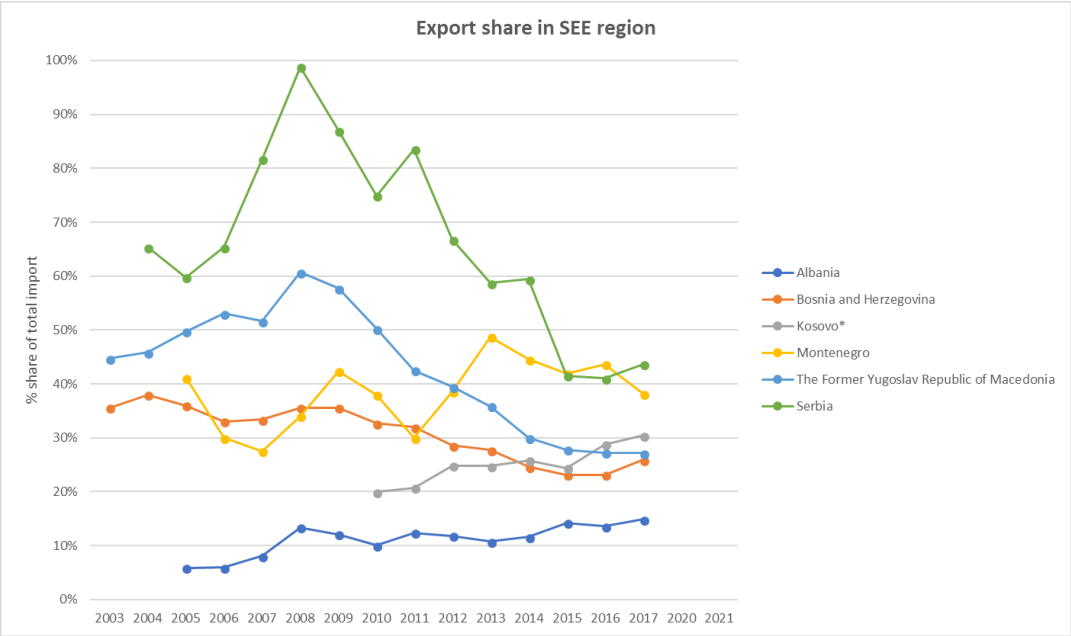


Figure 8: Export share in SEE region[viii].

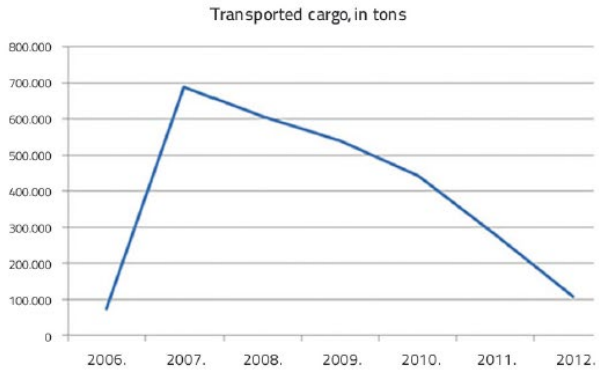
Road Transport

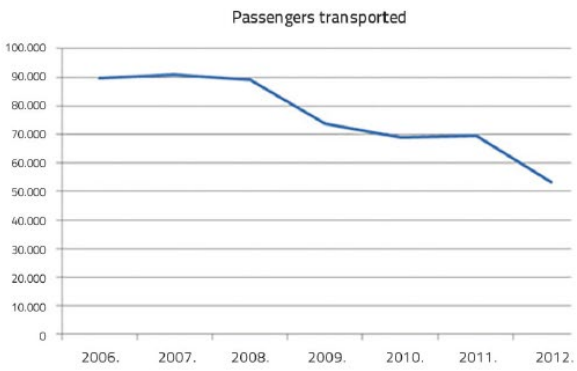
The road network includes 8 main and 23 regional roads with a total length of 1,860 km. In 2012 there were 197,826 registered road motor vehicles and trailers. Of the total number of registered motor vehicles, 75.4 % were passenger vehicles which were more than 10 years old, and of these, more than one third were more than 20 years old.

The railway infrastructure of Montenegro includes 250 km of railway track and there are 50 railway stations. The current poor condition of the railway infrastructure hinders normal transport and its existing volume is inadequate to generate sufficient revenue to cover its costs.

There are 4 international sea ports in Montenegro: Bar, Kotor, Risan and Zelenika. The most important of these is the port of Bar, which accounts for 95% of all port activities including the transport of passengers and cargo.

While air passenger transport has increased (7.9% in 2012 compared to the previous year), maritime transport has recorded a decrease in volume of 61.1% in cargo and 23.3% in passenger transport during the same period (2011-2012). Decline in the transport of cargo has been evident since 2009. (figure,,,)





As there is no primary or secondary collection of waste, and given the poor records on the structure and quantity of waste, there is currently no accurate quantitative data on the structure of municipal waste generated on an annual level in Montenegro. 457,610.73 tons of industrial waste was generated in 2012.

The basic macroeconomic indicators

Macroeconomic indicators	2007	2008	2009	2010	2011	2012	2013
BDP in the current prices	2.680,0	3.085,6	2.981,0	3.104,0	3.234,0	3.148,9	3.35011
BDP real growth rate	2.680,0	3.085,6	2.981,0	3.104,0	3.234,0	3.148,9	3.35011
BDP per capita in EUR	4.280	4.908	4.720	5.006	5.211	5.063	5.402
BDP PPS per capita	10.000	10.700	9.700	10.200	10.600	10.300	-
Industrial production-growing rate %	0,1	-2	-32,2	17,5	-10,3	-7,1	10,6
Manufacturin industry – growing rate %	9,3	-11,3	-38,6	-0,3	6,8	-10,1	-5,0
Inflation,consume r price method %-December	4,2	8,5	3,6	0,7	2,8	5,1	0,3
Number of tourist arrivals	1.133. 432	1.188.116	1.207.694	1.262.985	1.373.454	1.439.500	1.492.006
Number of employed persons	216.902	166.221	174.152	161.742	163.082	166.531	171.474
Unemployment rate %	11.9	16.8	19.1	19.7	19.7	19.7	-
Exports of goods and services (mil.EUR)	1.156,4	1.226,4	1.027,8	1.157,7	1.382,6	1.389,4	1.460,513
Import of goods and services	2.305,7	2.880,5	1.948,8	1.960,5	2.099,6	2.166,4	2.143,7
Trade balance (mil.EUR)	-1.149,3	-1,654,1	-921,0	-802,9	-717,0	-776,9	-683,2
Foreign direct investment-net	524,9	567,6	1.066,5	552,0	389,1	461,1	323,9

(mil. EUR)							
Poverty rate %	8,0	4,9	6,8	6,6	9,3	11,3	-

Table 6. Macroeconomic indicators[ix]

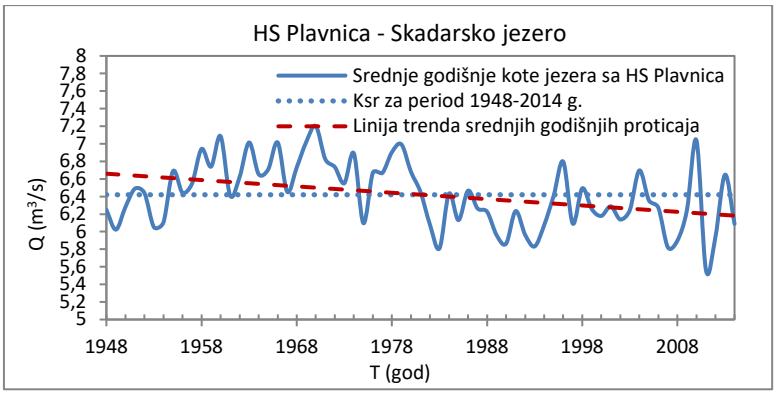
2.3. Water

A map of the main rivers in Montenegro shows the transboundary character of the rivers and the economy's largest lake. All impacts on water resources (natural, anthropogenic) can affect the downstream users in other economies and may be a cause of potential conflict.

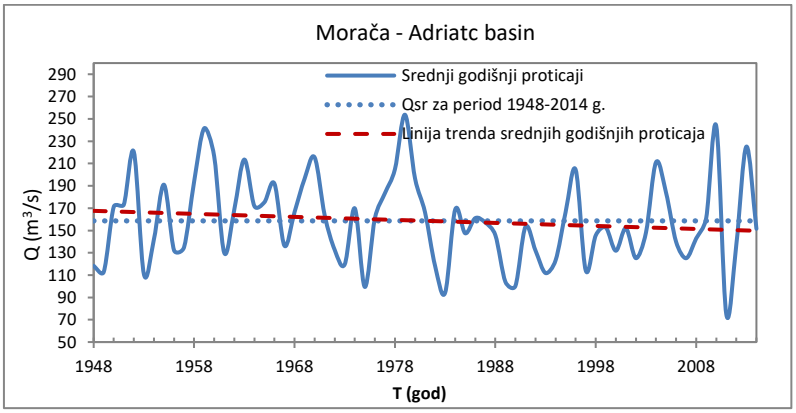
The hydrological observations on the economy's major rivers and Lake Skadar indicate a slight negative trend in flow (rivers) and water level (Skadar Lake). At the same time, in the last ten years the economy has experienced the maximum recorded water levels and flows in most rivers and the largest lake.

Since the beginning of the 1980s, the total water balance in Montenegro has been decreasing despite the extremely high recorded water levels and flows in the last ten years.

The trend of average annual levels of Skadar Lake:



Trend of mean annual flow on the river Morača



Trend of mean annual flow on the river Lim

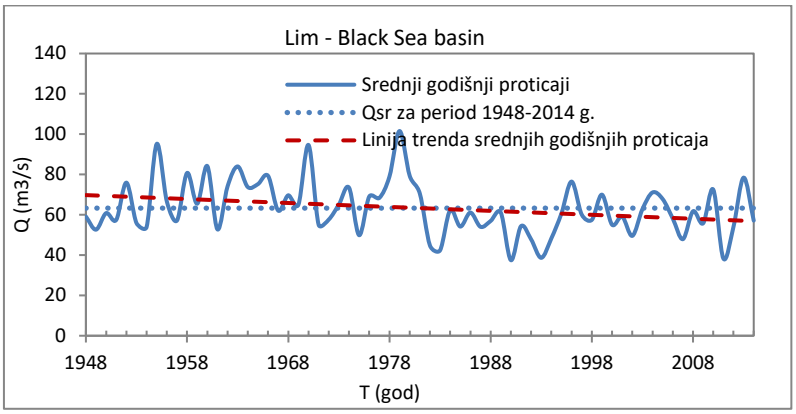


Figure 11: Trend of mean annual flow on Skadar Lake, river Moraca and river Lim (Black sea basin); blue line: average annual flow, blue dots: average flow for the period 1948-2014; red broken line: trend line of average annual flow.[x]

There are two river basins in Montenegro: the Black Sea basin and the Adriatic Sea basin. The Black Sea has a total area of 7,260 km^2 (or 52.5% of the territory), and the Adriatic Sea has a total area of about 6,560 km^2 (or 47.5%). The major rivers which flow into the Black Sea Basin are the Lim (the longest river, 220 km long), the Tara (146 km), the Ćehotina (125 km) and the Piva (78 km). Rivers that flow into the Adriatic Sea Basin are the Morača (99 km), the Zeta (65 km) and the Bojana (40 km). Important water resources also include natural lakes, the most significant of which are Biogradsko, Plav, Black Lake, Šasko (and Skadar Lake. The largest artificial reservoir is Piva Lake which

has a total accumulation capacity of 880x106m^3. Other significant accumulations include Slano, Krupac and Vrtac Lakes (225 x 106m$_3$) and Otilovići Lake (18x106m^3).

About **95 %** of the water courses in Montenegro is formed on its territory and flows to other economies; as such, only a small amount of transit water enters the economy.

Montenegro has significant surface and underground water resources, which are of relatively good quality. The richness and quality of water resources are among the most important comparative advantages of the economy.

The volume of water abstracted from all sources (surface and ground water) has stabilized at around 110 mil m^3 / year; total delivered and water consumption to around 50 mil m^3/year. The differences in the two numbers indicates high water losses from the public water supply systems.

The quantity of the drinking water supplied in recent years has stabilized in the range of 33.5 to 35 million m^3/y, while the industry is evident in the decline of 3-4.5 million m^3/y. Water use for irrigation is approximately 1.7 million m^3 /yr which is a large decrease relative to the previous period (6-9 million m^3 /yr).

The water exploitation index[xi] (WEI) reflects the pressure of abstraction on water, with values above 20 % indicating water scarcity, whereas values higher than 40% indicate severe water scarcity. According to the Economy level data, WEI for Montenegro is below 20%, which means the Economy is not exposed to water 'scarce' situation (Source: Nexus Regional Study).

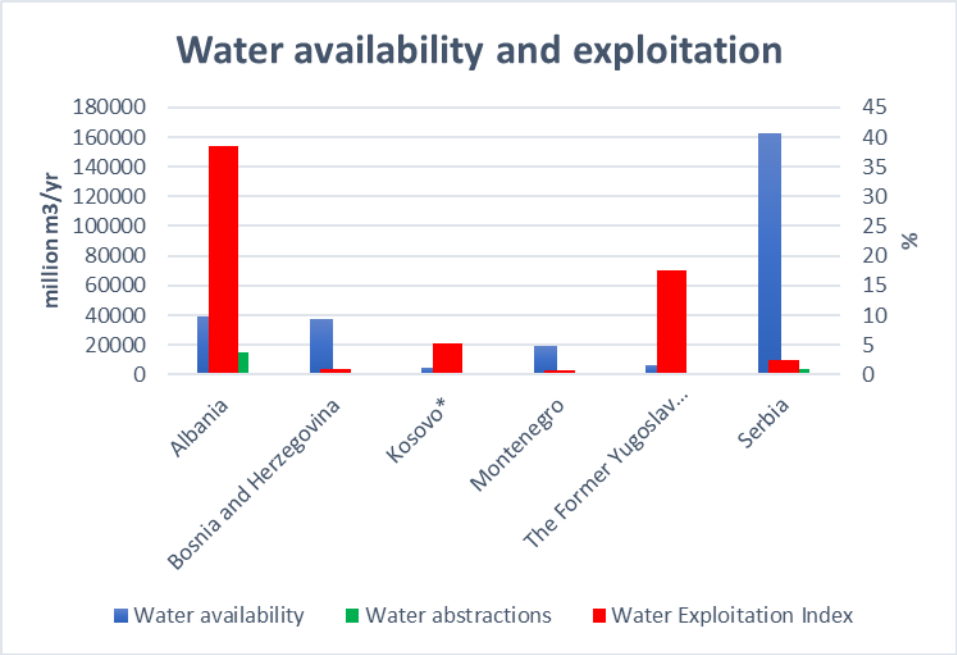


Figure9: Water availability and abstraction (in million m^3/yr) and Water Exploitation Index (in %), latest year available[xii].

The coastal area of Montenegro faces pressure from water consumption, as shown by the river basin related Water Exploitation Index +.

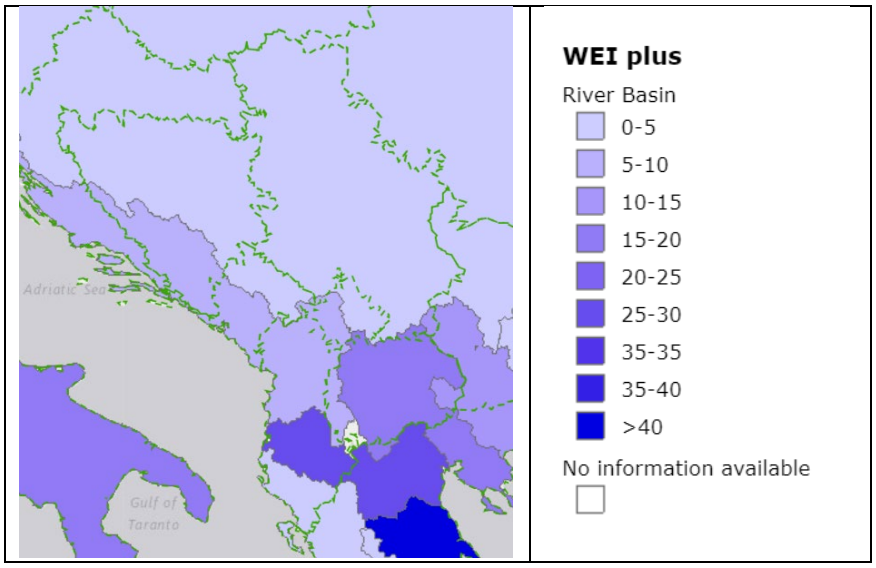


Figure 2: WEI + (January 2012)[xiii]

The volume of water abstracted by business entities that manage public water supply and sewage in Montenegro increased by 0.8% from 2011-2014. The 80.6% of water is abstracted from groundwater and spring water, 1.8% is abstracted from surface water, while 17.6% of the total volume of water abstracted is from other water supply systems.

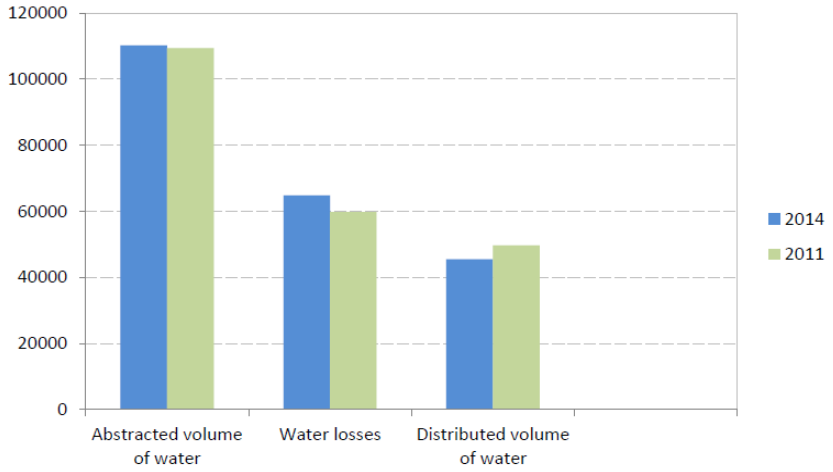


Figure 11. Water abstraction by business entities from 2011-2014

The mean annual flows and water levels trend indicates a noticeable negative trend for the period of available data (about 70 years). The analysis covered the three most important hydrographic objects in Montenegro.

The largest water consumers are industry and the population. Statistical data shows that the volume of water abstracted during the period 2005-2011 to supply the public water system increased from 101.9 million m^3 in 2005 to 109.5 million m^3 in 2011Of the total volume of water abstracted in 2011, 49.67 million m^3 was delivered to the public water supply system, which is 7.4% less than in 2005 (53.67 million m^3). Of the total delivered volume of water in 2011, 35 million m^3 or 70.4% was delivered to households, 9.6 million m^3 or 19.3% to enterprises and 5.1 million m^3 or 10.3% to other users. For the production of energy, there is no

data on the amount of water used, except data on produced energy based on water resources. However, this amount is undoubtedly the largest water user. Losses in water delivery to the water supply system increased during the observed period (2005-2011), from 48.19 million m^3 in 2005 to 59.77 million m^3 in 2011, i.e. the amount lost increased by 24%.

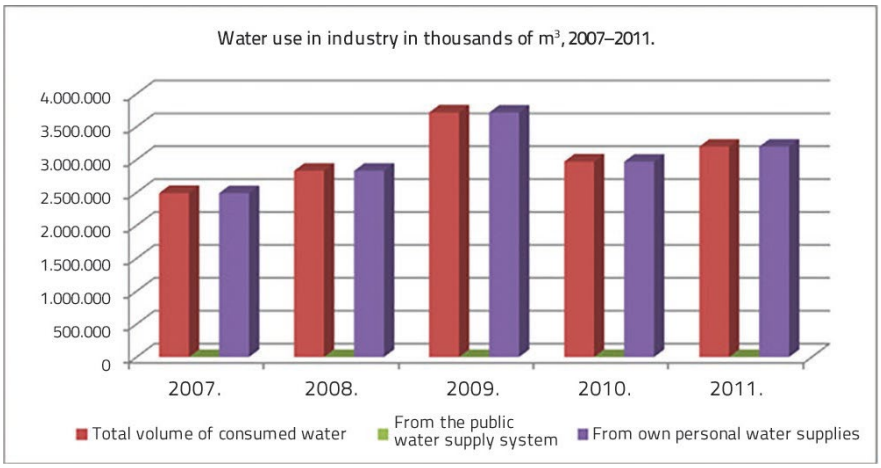


Figure 12: Water use in industry from 2007-2011

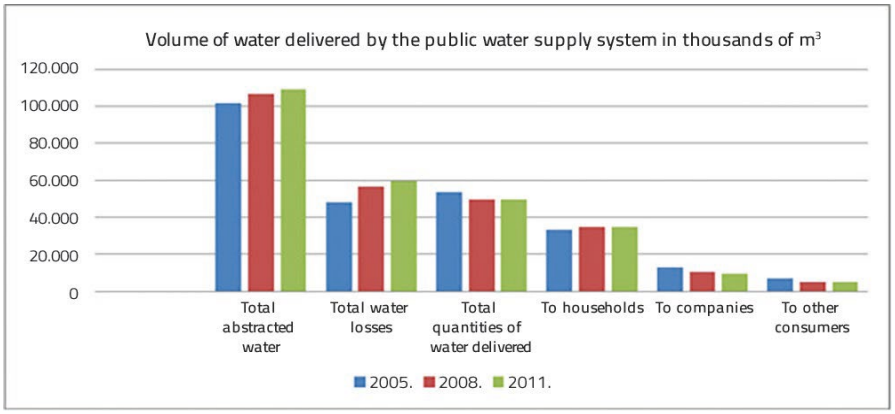


Figure 13: Volume of water delivered by the public water supply system in 2005, 2008 and 2011

Water use for irrigation during the observed period (2007–2011) is shown in figure 14. Underground water sources are mainly used for irrigation (96.6% in 2011), while surface sources are used very little (3.4% in 2011).

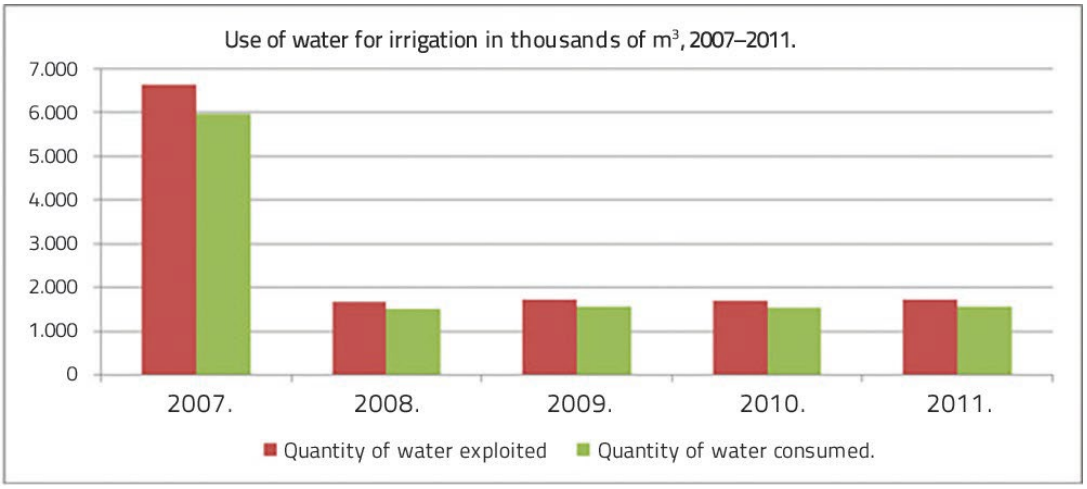


Figure 14. Water use for irrigation from 2007-2011

Drinking water and sanitation are safely managed for large proportion of the population, up to 98% in Montenegro regarding drinking water and between 91-98% regarding the sanitation[xiv]. Only a low proportion of the household's income is spent on drinking water, sanitation and hygiene 2-5%, which can thus be considered affordable[xv].

2.4. Energy

Montenegro currently does not import natural gas. In September 2007, the governments of Montenegro, Croatia and Albania signed *the Declaration for the construction of the Adriatic-Ionian gas pipeline* with a total investment value of €230 million, of which Montenegro's obligation is estimated at €60 million. Bosnia and Herzegovina is expected to join this project soon. This gas pipeline would be connected to the international gas pipeline network from which all four markets would receive around 5 billion m^3 gas. Through the introduction of new and environmentally friendly technologies, the project would substantially contribute to the improvement of energy efficiency and possibilities for the substitution of electrical energy and liquid fuels in Montenegro.

Montenegro has the lowest import share in the region, figure 15. Regarding future projections, from 2020, Montenegro, due to the expansion of hydropower and to the lowest demand in the region, will start exporting electricity to neighbouring Economies as a result of the decrease in exports from Bosnia and Herzegovina[xvi].

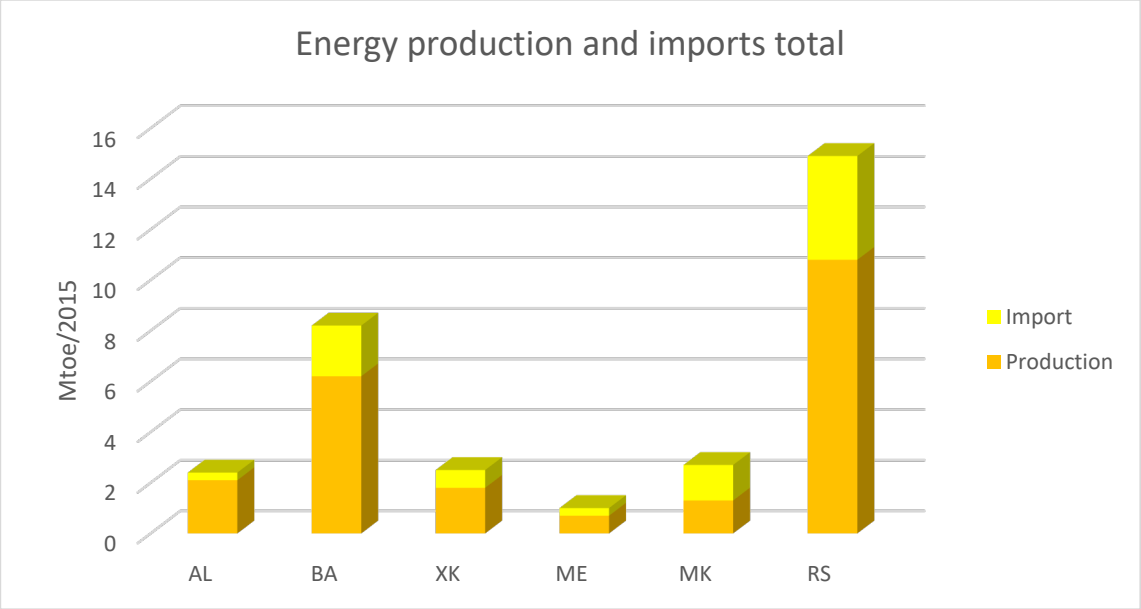


Figure 3: Energy production and imports of the SEE2020 economies in 2015[xvii]

Hydropower is one of the main sources to produce electricity. The production reflects the dependency on rainfalls and runoff, thus is interannually variable.

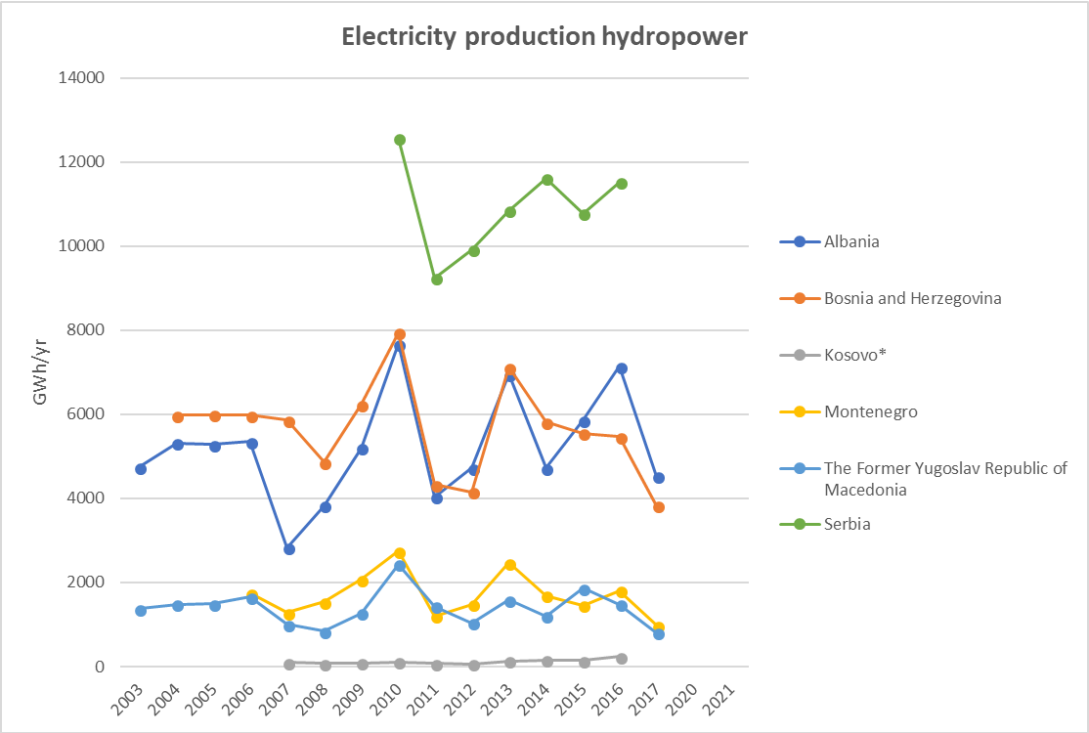


Figure 16: Electricity production by hydropower (GWh/yr) [xviii]

The main hotspots of biodiversity and threat from hydropower are:

- Morača/Skadar system in Montenegro and Albania with eleven listed species; and
- Tara/upper Drina system in Montenegro and Bosnia and Herzegovina with nearly 200 kilometres of free-flowing riverine habitat.

The following figure provides a tentative overview on existing and planned hydropower plants.

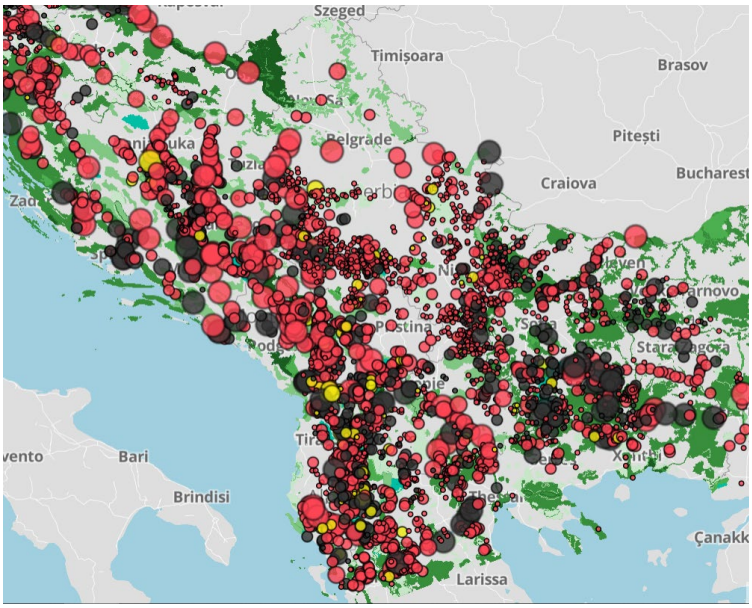


Figure 17: Planned hydropower developments in SEE[xix]

In the past years, the speed of construction of new hydropower plants is increasing. However, Montenegro still has the lowest planned hydropower plants with respect to other economies in the region.

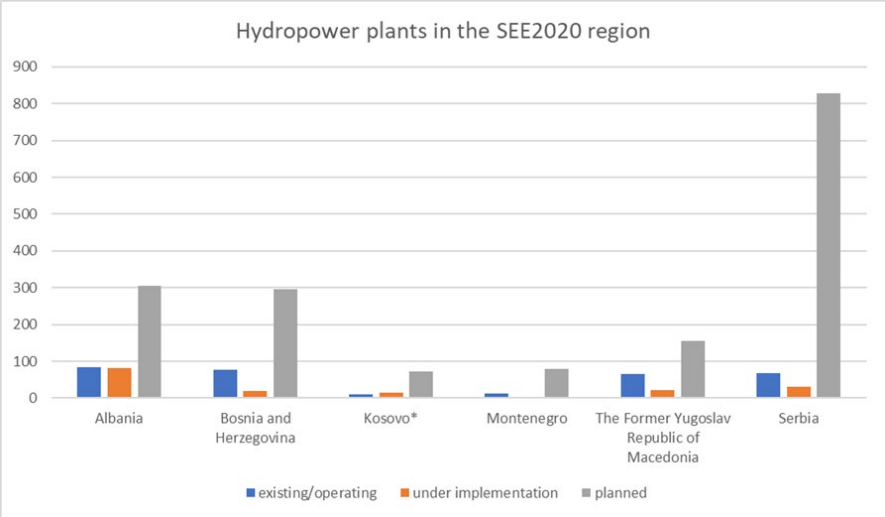


Figure 18: Hydropower plants in Montenegro and the SEE2020 region[xx]

Montenegro shows lower energy efficiency in the region compared to the economic growth. It slightly increases from the 2014.

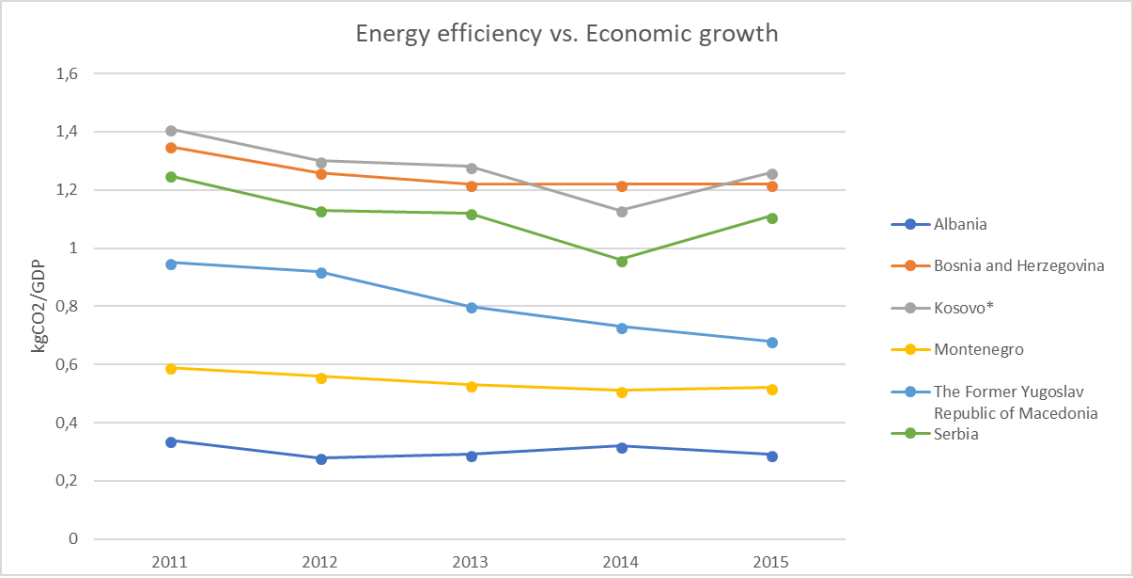


Figure 4: Evolution of energy efficiency in Montenegro compared to economic growth in the SEE2020 economies[xxi].

The trend in energy consumption in Montenegro shows increase of efficiency / capita between 2011 and 2015 in the region.

Compared to the EU, primary energy consumption per capita in Montenegro is significantly lower than, while electricity consumption per capita is above the EU average. Existing data (although they are not systematically and continuously calculated) indicate that there is a significant area for introducing energy saving measures and achieving energy efficiency.

Table

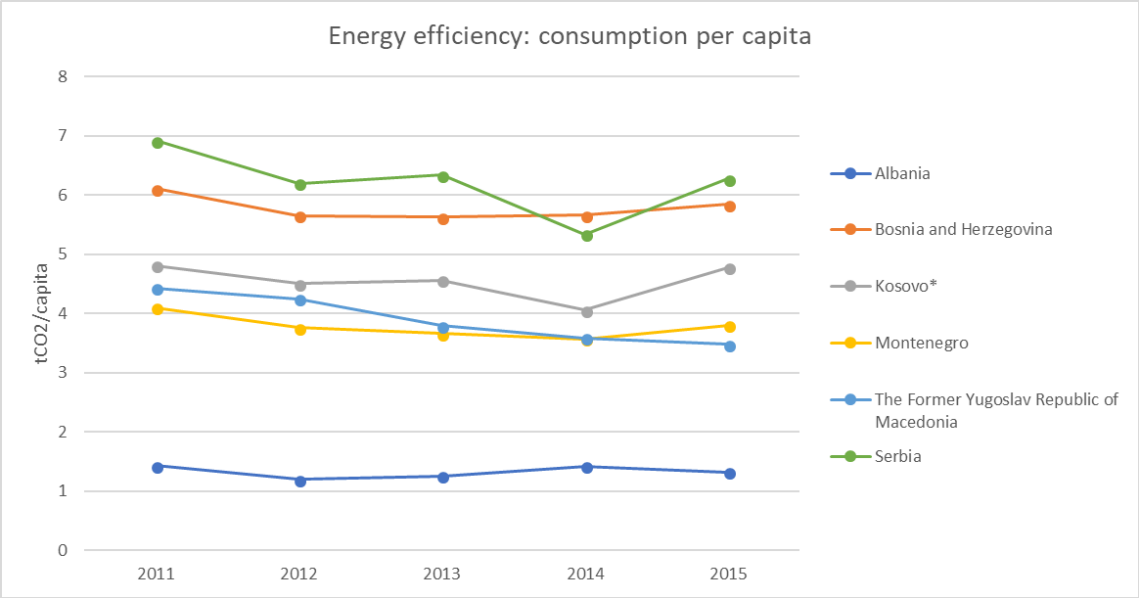
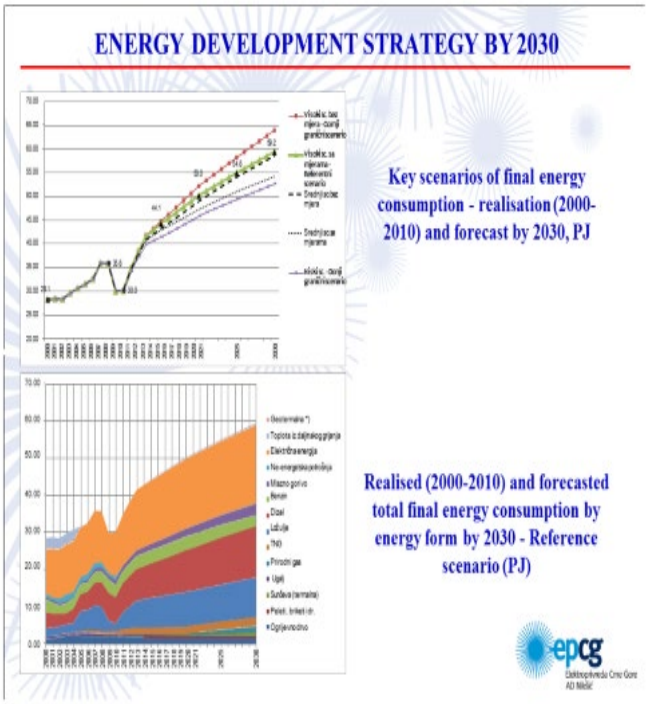


Figure 21: Energy efficiency in Montenegro with respect to the SEE2020 region: energy consumption per capita (tCO2)[xxii].



In late 2013, Montenegro invited international oil and gas companies to bid on licenses to explore its offshore coast. It is expected that the exploration will begin in 2017 and several more licensing rounds are foreseen by 2020 for additional exploration blocks.

Exploration for other types of renewable energy sources in Montenegro intensified during the period 2007-2012 when estimates were made regarding the potential for electricity

production using wind, sun and biomass. The total gross capacity of wind turbines that could be installed amounts to approximately 400 MW, assuming that potential is calculated on the basis of either high or medium level productivity; of this 100 MW refers to areas of high productivity (i.e. with an approximate capacity factor of 30%) and 300 MW refers to areas of medium productivity (i.e. with an approximate capacity factor of 25%). Technical wind potential has been estimated as being approximately 900 GWh/year. Theoretically, the potential of solar radiation could be estimated as being about 20 PWh/year, assuming that the average amount of solar insolation in Montenegro is around 1,450 kWh/ m^2 year. The estimated average consumption of firewood in 2008 was 560 GWh/year and this is expected to increase to 620 GWh/year by 2030.

The first wind farm in Montenegro is in Krnovo, with a capacity of 72MWh, while the second wind farm in Mozura, with a capacity of 46MWh, is under construction.

The most important development project in the transmission system is the construction of a one-way underwater energy cable to export power to Italy, the laying of which was completed in February 2017. According to an agreement signed in 2010, the cable, which cost €800 million, runs for 433 kilometers, 1200 meters below the Adriatic Sea surface. The project is expected to be completed by the end of 2018.

GHG emissions (source EPA of Montenegro)

Godina	Energy (Gg CO_2 eq)	Industrial processes (Gg CO_2 eq)	Agriculture and land use (Gg CO_2 eq)	Waste (Gg CO_2 eq)	Total emissions with sinks (Gg CO_2 eq)	Total emissions without sinks (Gg CO_2 eq)
	2,352.61	2,372.87	-987.83	196.18	3,657.27	5,338.52
1991.	2,450.28	2,909.18	-691.16	34.97	4,703.27	5,985.49
1992.	1,809.33	1,891.39	-1,504.53	45.41	2,235.27	4,393.39
1993.	1,602.90	709.60	-1,974.81	57.43	418.00	2,923.52
1994.	1,428.09	94.12	-1,946.76	68.97	-364.57	2,121.89
1995.	825.24	2,372.87	-1,263.66	80.39	1,914.84	3,742.74
1996.	1,842.40	294.48	-1,592.61	91.69	635.96	2,788.23
1997.	1,850.80	1,347.59	-1,855.69	105.17	1,647.87	4,043.37
1998.	2,259.86	1,471.88	-1,882.02	116.04	1,965.76	4,380.87
1999.	2,332.16	1,648.27	-1,895.22	126.57	2,211.78	4,640.09
2000.	2,427.50	2,046.92	-1,921.70	136.79	2,689.51	5,156.35
2001.	2,013.42	2,173.09	-1,831.38	146.02	2,501.15	4,847.49
2002.	2,517.68	2,323.86	-2,171.93	154.39	2,724.00	5,415.80
2003.	2,427.77	1,846.00	-1,771.35	161.92	2,664.34	4,962.67
2004.	2,388.09	1,665.62	-1,367.44	168.61	2,854.88	4,726.41
2005.	2,200.59	1,344.11	-1,730.85	174.48	2,188.63	4,278.82
2006.	2,356.22	1,635.67	-1,044.51	179.63	3,127.01	4,319.17
2007.	2,293.34	1,769.81	-2,042.20	184.25	2,205.20	4,628.58
2008.	2,904.72	930.08	-1,907.74	188.21	2,115.27	4,355.32
2009.	1,979.14	572.38	-2,080.66	190.26	661.12	3,009.31
2010.	2,725.54	722.66	-1,725.92	193.65	1,915.93	3,904.95
2011.	2,768.15	765.59	-1,583.79	197.41	2,147.36	4,017.89
2012.	2,684.24	398.94	-1,754.26	200.49	1,529.41	3,371.94
2013.	2,415.87	282.93	-1,941.39	199.26	956.67	3,178.28

Table 7. GHG emissions from 1991 – 2013 from the energy, industrial processes, agriculture and waste, expressed in GgCO2 eq.

Total emissions with sinks:

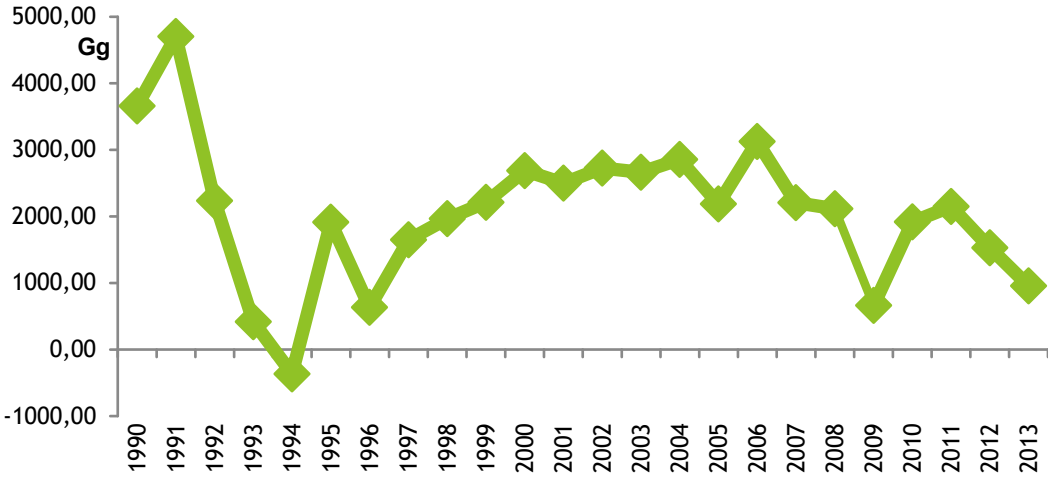


Figure 22. Emissions with sinks based on the data in the table 7 (Source EPA of Montenegro)

Total emissions without sinks:

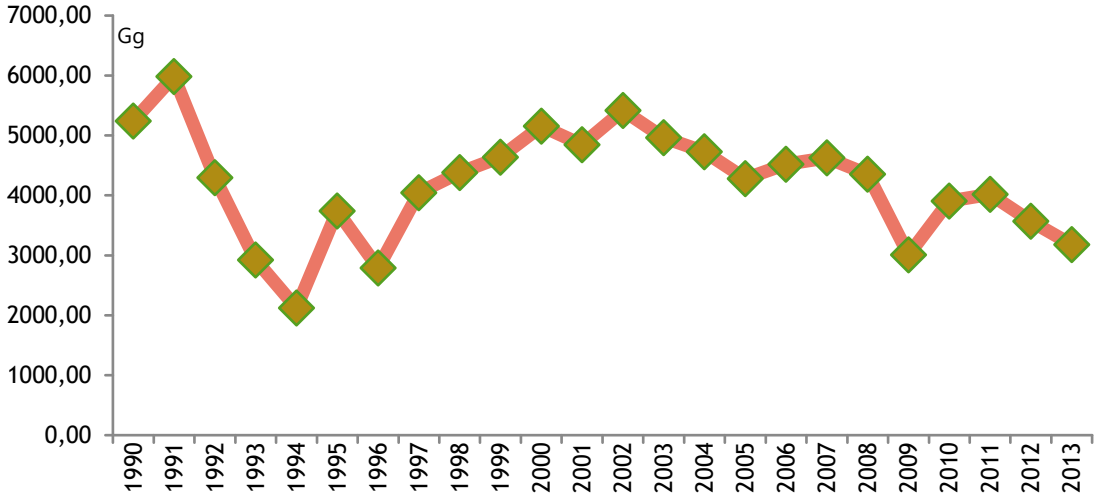


Figure 23. Emissions with sinks based on the data in the table 7 (Source EPA of Montenegro)

As shown on the figure below, the energy and industrial processes sectors account for the largest share in total CO_2eq emissions for the observed period. Consequently, depending on the consumption of energy sources, as well as the level of industrial production, there is a decrease in the estimated emissions in the observed period.

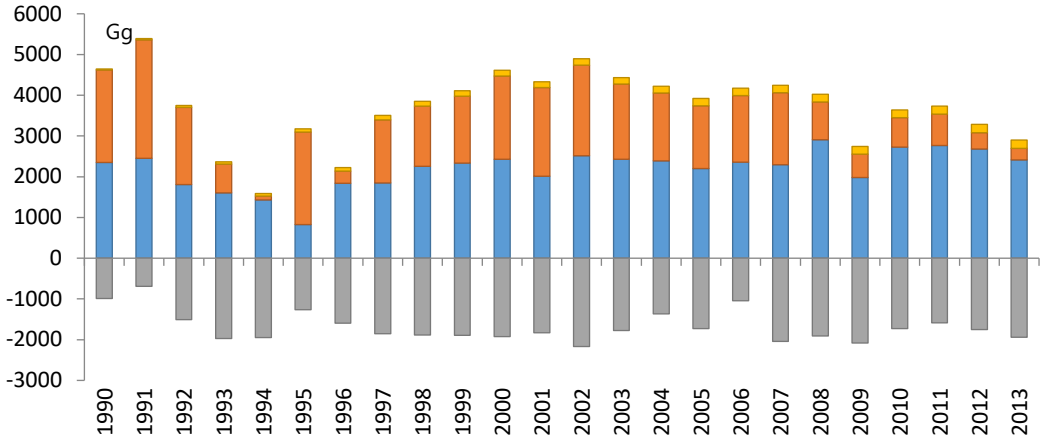


Figure 23. Share of emissions from waste (yellow, agriculture and land use (grey), industrial processes (orange),and energy (blue) in Gg

The share of emissions from the energy sector ranges from 22.12% in 1995 to 76.10% in 2013. The share of industrial process emissions ranges from 4.43% in 1994 to 60.91% in 1995. CO_2 eq emissions from the agriculture sector ranged from 6.54% in 2010 to 20.16% in 1994, while the waste sector has the smallest share in total emissions and ranges from 0.38% in 1990 to 6.33% in 2009.

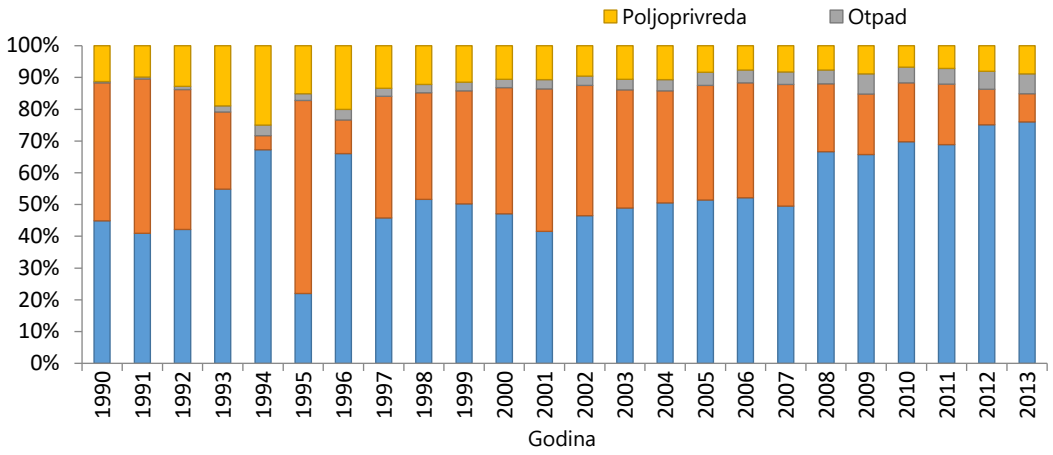


Figure 23. Share of emissions from waste (gray), agriculture and land use (yellow), industrial processes (orange),and energy (blue) in %

Renewable energy

Measure 2: Construction of new hydropower plants

Reconstruction of two existing large hydro power plants (HPPs) is planned by 2020:

• HPP Perućica: increase of installed power from 307 MW to 372 MW (2017); investment cost 44 mil. EUR

• HPP Piva: increase of installed power from 342 MW to 363 MW (2018); investment cost 70 mil. EUR

The construction of two new large hydro power plants (HPPs) is also planned by 2020:

• Morača HPP - 238 MW (2019); investment cost 543 mil. EUR
• Komarnica HPP - 168 MW (2020); investment cost 183 mil. EUR

With regard to small power plants, the construction of 44 HPPs of total installed power of 80.61 MW and planned annual production of 257, 5 GWh has been approved so far.

Measure 3: Construction of a biomass power plant

Construction of a biomass power plant is planned until 2020. installed power of 29.3 MW and planned production of electricity of 101 GWh; the investment cost is 67 mil. EUR.

Measure 4: Construction of wind farms

The construction of several wind turbines (VEs) is planned by 2020:

• VE Capable of installed power of 46 MW (construction already started)
• VE Krnovo installed power of 72 MW (construction already started)
• VE (in unknown locations) installed power of 33.2 MW (2016-2020)

The total investment cost is estimated at about 195 mil. EUR, until 2020

2.5. Food/Land/Agriculture

Of the total surface area of Montenegro, 515,740 ha or 37% is suitable for agriculture, and of that amount only 16% is used for agricultural purposes; this equals 0.83 ha of agricultural land per capita.

Overall, agricultural production recorded variable growth during the period 2007–2011. A greater increase was noticeable in the area of livestock breeding in 2011, while growth in the area of crop production was small, showing some oscillations and a visible trend of a slight decline. Overall, agricultural production in Montenegro declined by 12.7% in 2012 compared to 2011, due to a 13.7% decline in crop production and a 11.4% decline in livestock breeding. The share of crop production represented in the total agricultural production figures in 2012 was 56.6% and the share of livestock breeding was 43.4%.

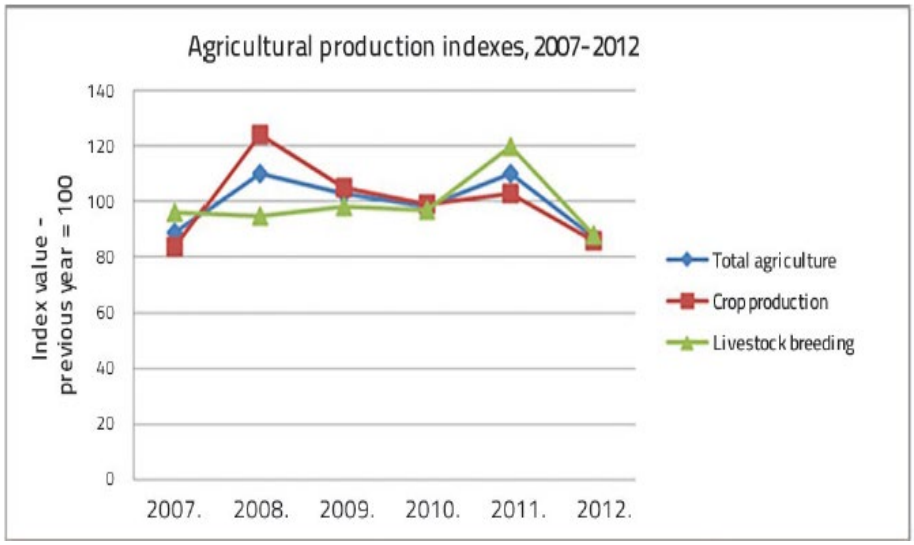


Figure 24: Agricultural production indexes from 2007-2012[xxiii]

The farm structure survey in 2016 indicated a significant increase in utilised agricultural area under arable land, vineyards, orchards, meadows and pastures compared to the same areas from 2010. (MONSTAT)

The farm structure survey in 2016 indicated a significant increase in utilised agricultural area under arable land, vineyards, orchards, meadows and pastures compared to the same areas from 2010. (MONSTAT)

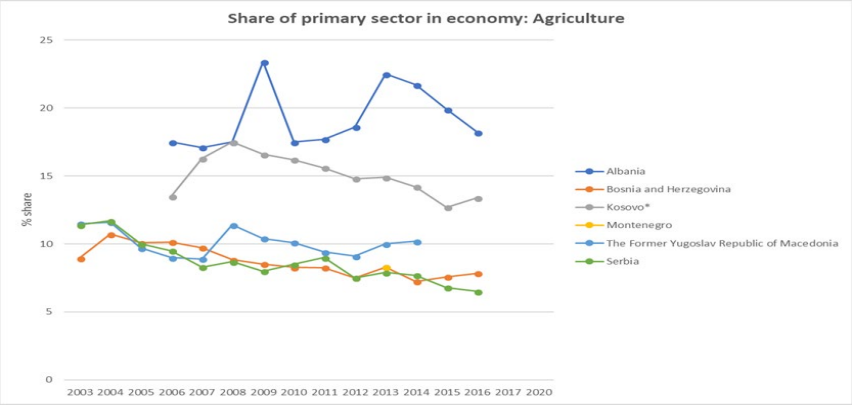


Figure 25: Share of primary sector in economy in Montenegro with respect to other economies in the region: Agriculture[xxiv]

The most important crops are vegetables and fruits, while the commercial production of farm crops (cereals, maize, sugar beet, oilseed)2 is poorly represented. A slight growth in the production of arable crops is noticeable during the period 2007–2011. The main crops are potatoes (with a yield of about 180,126 tonnes (t) in 2011 and 132,674 t in 2012) and vegetable crops (about 142,700 t of yield in 2011 and 133,487 t of yield in 2012). The most commonly grown fruit crops are plums (, apples, pears, peaches and also oranges and tangerines in the south and figs. There are about 495,200 fruit-bearing olive trees.

Livestock breeding is a significant part of the agriculture sector. During the period 2007-2011, a drastic decline in the number of heads was recorded compared to 1999: cattle (51%), poultry (42%), sheep (37%), pigs (7%), and horses (71%). Official statistics, which only started to be published in 2012, of the goat population indicated a much smaller sector than previously estimated.
71.4% of the agriculture holdings in the economy breed livestock and/or poultry. The number of livestock agricultural holdings has reduced by 4.3% since 2010.

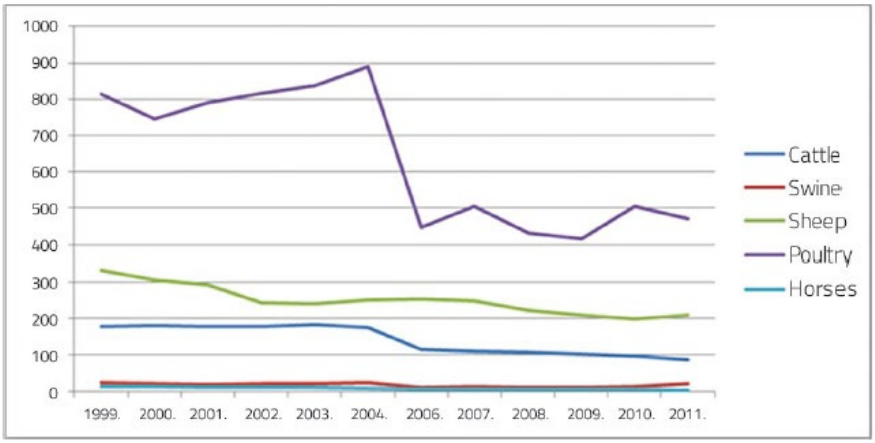


Figure 26: Livestock during the period 1990-2012 (in 000 animals)[xxv]

According to the 2016 farm structure survey, the total number of actively employed persons in the agriculture sector is 99, 236.

Mining in Montenegro remains a major economic and landscape forming activity. Study of future land use in the Western Balkan are not available[xxvi] .

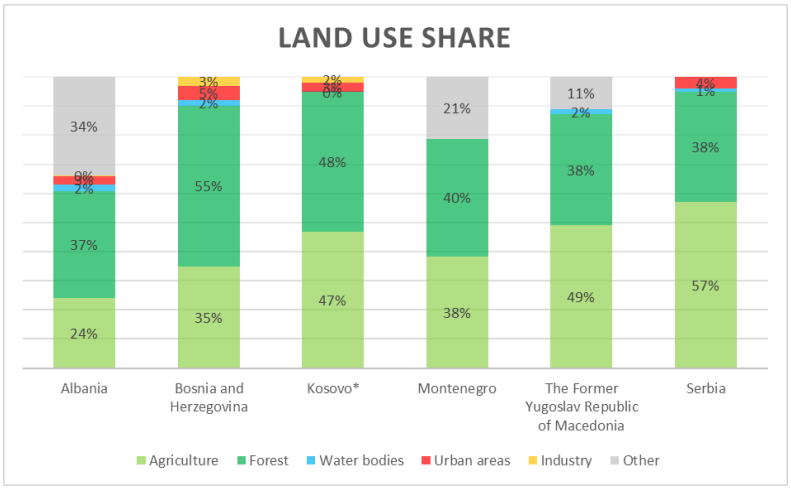


Figure27: Land use share of the SEE2020 economies[xxvii]

New consumption patterns, facilitated by new supermarkets and processed food products, are spreading quickly and are expected to raise environmental impacts related to food. Montenegro like the economies in the region (Albania, Bosnia and Herzegovina and The Former Yugoslav Republic of Macedonia) is net importer of agricultural and food products[xxviii]. The future of food consumption patterns in the region and any related environmental and health problems will be tied to a series of drivers. One will be the evolution of cultural patterns, such as preferences for locally grown food and traditional products. Markets and business, including decisions by large retailers and advertising by food companies, will be another important force. Government policies and individual actions and can also play a key role. No trend analysis of the links between food consumption patterns and the environment is possible, due to data gaps[xxix].

FAO[xxx] estimates the number of 'severely food insecure people' for the 3-year-period 2014-2016 less than 100,000 in Montenegro what is the least in the region.

2.6. Biodiversity

The biodiversity in Montenegro has faced a series of threats, including a sprawl of built-up areas in urban and coastal zones, mining activities and unregulated hunting and timber cutting what is the common facts in the region. At the same time, government in Montenegro has taken a series of steps to protect species and habitats. Predictive or forecasting indicators for ecosystems and biodiversity in the region are not available[xxxi], thus no projections can be provided for the future evolution of biodiversity.

Overall by 2018 by 2018, 9 protected areas had been identified in Montenegro and the share of its economy is 6.4% what is the less in the region.

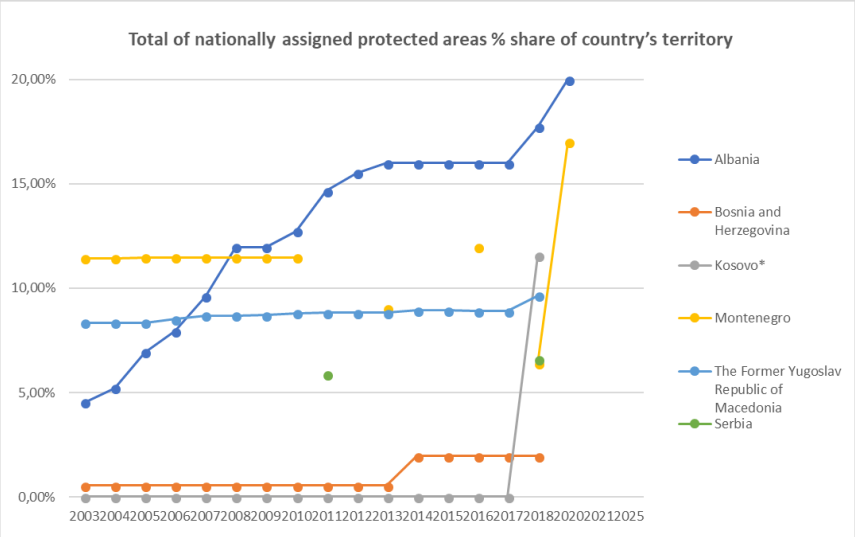


Figure 27: Protected areas as a share of the territory[xxxii].

In Montenegro, the following 6 main categories of anthropogenic threats can be identified: uncontrolled urbanization and tourism development in natural habitats with associated infrastructure development; changes in land use practices, particularly in relation to agriculture and forestry; unsustainable and illegal use of natural resources (including illegal hunting, overharvesting etc); water, soil and air pollution from industrial and agricultural pollutants and municipal wastes; introduction of alien invasive species; impacts of climate change, especially the effects of hot and dry periods on forest habitats which need to be the focus of more attention. The impact of alien and invasive species and climate change are still poorly investigated but can be expected to have a higher importance among threats to biodiversity in the future[xxxiii].

Montenegro's Ecological Footprint

During the period 2006-2015, Montenegro's ecological footprint increased from 2.7 to 3.9 gha per person, representing a 45% increase, while its biocapacity remained almost constant (shifting from 2.70 to 2.67 gha per person). In 2015, Montenegro was characterized by an ecological deficit as its biocapacity was able to satisfy around 70% of the overall demand for resources and services of its residents. Results for Montenegro are available for the period 2006 - 2015.

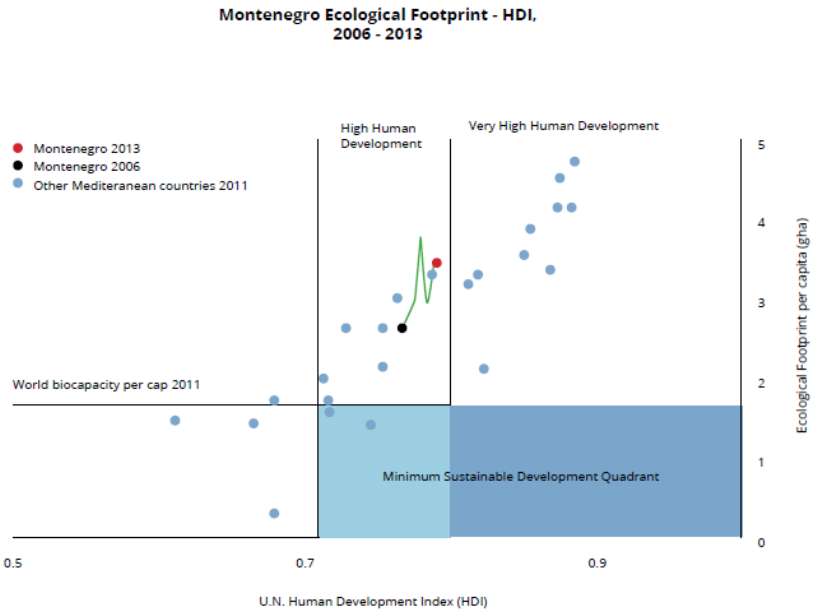


Figure 28: Montenegro's Ecological Footprint path and HDI in the period 2006-2013 marked with the red dot, while blue dots represent Mediterranean economies in 2011. Only two economies in the region of the Mediterranean meet the minimum requirements necessary for achieving sustainable development (shown in blue shaded area in the lower right corner of the Chart) i.e. meet two conditions: the footprint per capita is lower than world's biocapacity of 1,8 gha and the HDI reaches at least 0,71.

Waste

Composition of municipal waste, expressed in % for the period from 1990-2013. (%), shows that plastic is the major waste in Montenegro and therefore a big problem for environment. The plastic wastes increases continuously with the maximum in nowadays. Opposite values are observed for the food waste with the minimum in nowadays. Paper waste decreases too.

Year	**1990.**	**1991.**	**1992.**	**1993.**	**1994.**	**1995.**	**1996.**	**1997.**
Food	31,2	30,4	29,7	28,9	28,2	27,4	26,7	25,9
Organic waste	13,8	13,6	13,4	13,2	13,1	12,9	12,7	12,5
Paper	27,3	27,2	27,1	27	26,9	26,8	26,7	26,6
Textile	2,9	2,9	2,8	2,8	2,7	2,7	2,6	2,6
Plastic	24,8	25,9	27	28,1	29,1	30,2	31,3	32,4
TOTAL	100	100	100	100	100	100	100	100
Godina	**1998.**	**1999.**	**2000.**	**2001.**	**2002.**	**2003.**	**2004.**	**2005.**
Food	25,2	24,4	23,7	22,9	22,2	21,4	20,7	19,9
Organic waste	12,3	12,1	11,9	11,8	11,5	11,4	11,2	11

Paper	26,5	26,4	26,3	26,1	26,1	26	25,9	25,8
Textile	2,5	2,5	2,4	2,4	2,3	2,3	2,2	2,2
Plastic	33,5	34,6	35,7	36,8	37,9	38,9	40	41.1
TOTAL	100	100	100	100	100	100	100	100
Year	**2006.**	**2007.**	**2008.**	**2009.**	**2010.**	**2011.**	**2012.**	**2013.**
Food	19,9	18,4	18,7	17,9	17,2	16,4	15,7	13,9
Organic waste	11	12,2	13,2	12,7	13,9	14,7	10,4	13,1
Paper	25,8	23,7	22,8	22,5	22,4	22,8	22,8	21,3
Textile	2,2	3,7	4,1	4,3	5	4,7	2,9	2
Plastic	41,1	42	41,2	42,6	41,5	41,4	48,2	49,7
TOTAL	100	100	100	100	100	100	100	100

Table 8. Composition of municipal waste, 1990-2013. (%)[xxxiv]

3. Institutional setting

Biodiversity management and protection are under the jurisdiction of the **Ministry of Sustainable Development and Tourism,** but some sub-sectors of natural resources like water and forests are under the jurisdiction of the **Ministry of Agriculture and Rural Development**. This fragmentation of competencies and responsibilities interfere with planning and efficient implementation of programmes.

3.1. Policies and strategic documents

Biodiversity:

Biodiversit is governed by the S**trategy for Sustainable Development** and the **Biodiversity Strategies with the Action Plan** (for periods 2010 – 2015 and 2016 – 2020).
The **MSDT** is a key authority in charge of environmental policy and is responsible for nature protection, urban planning, climate change and the development of tourism. By the governmental Decree, the ANCE (former **EPA)** was created and is responsible for the protection of the environment through the implementation of regulations, licensing, inspection activities, preparation of monitoring programs and reporting in accordance with indicators on the state of the environment. They provide their reports to the MSDT, the EEA, CBD Secretariat and general public. Information collected and prepared by the ANCE should provide the basis for the adoption of laws, strategies, plans and programs, and in general, to create environmental policies at the level.

The statistics system, i.e. collection, processing and keeping statistics on economy level, is governed by the **Law on Official Statistics and Official Statistical System. The** institution responsible for the creation and maintenance of official statistics, including those of potential importance to biodiversity data management, is the **Statistical Office of Montenegro** (MONSTAT).

Fragmentation of competences is accompanied with underdeveloped inter-sectoral communication, which has negatively influenced biodiversity data management, especially in protected areas.

The by-laws, which should define standards and methodologies for storing data into a central management system, including the guidelines for collecting and structuring data in institutions that are responsible for data providing, are missing.

In the system of official statistics there is no planned research directly related to biodiversity. There is no operational solution for the systemic support of activities related to environmental protection (Environmental Fund) in Montenegro. (Source: https://balkangreenenergynews.com/wp-content/uploads/2017/08/Montenegro-Assessment_ENG.pdf)

The technical, organisational and personnel solutions for the management of primary (raw) biodiversity data within the Information system in ANCE (for further development of reporting towards Rio Conventions, Eionet and Natura 2000) are still open.

Serious drawback of such efforts is that, in absence of widely accepted standards for setting attributes for data collecting during field surveys and methodologies for data structuring, the data is dispersed in a variety of structures and is stored in different formats. It will be a challenge to harmonise and integrate it into a functional unit.
It should be pointed out that there have been problems and obstacles in accessing (geospatial) data collected and managed by Real estate administration, Geological Survey of Montenegro and the Forestry Administration.

The analysis of stakeholders relevant for the BIMR framework show an uneven distribution of stakeholders according their organisational background. More than half the legal entities are within governmental or academic background. Governmental institutions are represented by different directorates and sectors of the MSDT and the MARD. The academic community consists of faculties and institutes in the field of natural sciences in Podgorica and Kotor as well as the Natural History Museum of Montenegro. The assessment identified only six civil society organisations directly involved in biodiversity data collecting and handling.

The IPA Project "*Establishment of Natura 2000 network*" is important to the further development of data management on biodiversity in Montenegro. With this project. biodiversity data, which will support the completion of documentation for the nomination of sites into the Natura 2000 network in Montenegro will be collected, evaluated and processed.

The most important institutions for biodiversity data management and reporting in Montenegro are the MSDT and ANCE (former EPA), at governmental level, and the Department for Biology at the University of Montenegro, Institute for Marine Biology and Natural History Museum of Montenegro, at the academic level. The governmental institutions are ones with most political influence but have limited capacities for the efficient coordination and data handling

In general, there is a lack of technical and human capacities for setting an infrastructure and maintaining tools necessary for providing data in a digital environment.

Assignment of roles for biodiversity data management with appropriate institutional set-up is generally defined but in the absence of precise procedures a data flow between governmental institutions is weak and ineffective or even completely lacking. There is no developed system of rules for collecting and structuring biodiversity data for providing reports to the ANCE. The lack any kind of guidance has a negative effect on the usability of biodiversity data collected by primary biodiversity data collectors from academic and the NGO community. Data share between biodiversity data providers and supporting data providers is almost
completely missing.

Key features of the assessment are reflected in the following table:

Nexus coordination body in place	None. Two important nexuses: - The Sava Nexus Assessment - The Drina Nexus Assessment (https://www.unece.org/fileadmin/DAM/env/water/meetings/Water_Convention/2016/Workshop_Podgorica_21-22.04_on_Assessing_the_Water-Food-Energy-Ecosystems_Nexus_and_Benefits_of_Transboundary_Cooperation_in_the_Drina_River_Basin/9-Stephen_Stec_-_Governance.pdf)
Water Council includes sector representatives	The Water Council does not function yet. It was created in the Water Directorate. Its formation is still in planning procedure. There is no information on criteria by which representatives of various sectors will be elected.
Nexus coordination instrument in place	
Authority for Water (one single, several, at different levels?)	The Law on Waters, with the legislation as a whole, provides an appropriate legal framework for establishing an optimal water management organization in Montenegro. From the point of view of the organization of the administration, this organization can be seen at the level of state administration and local self-government. Authorities: - Government - Ministry of Agriculture and Rural Development (MARD) - The Water Directorate under the MARD - The Ministry of Sustainable Development and Tourism (MSDT) - The Directorate for Environment and the Directorate for Utility Services - The Ministry of Health (MH) - The Institute for Public Health - The Ministry of Economy - The Ministry of Transport and Maritime Affairs

	- The Environmental Protection Agency (EPA) - Institute of Hydrometeorology and Seismology - The Public Enterprise for the Management of Maritime Goods - The Inspection Department - The Maritime Safety Administration - The Institute of Marine Biology At the state level, there is primarily the Government, which, as the holder of the executive power, has numerous powers established by the relevant law. In this sense, the Government is in charge of adopting key planning documents, then the most important decisions and normative acts and the establishment, i.e. education of executive bodies and bodies of importance for the area of water. After the Government, there is definitely a line ministry for water affairs (Ministry of Agriculture and Rural Development - MARD), which is absolutely authorized to propose the establishment of water policy and to implement it, perform international cooperation, then bring it, and when this is done by the Law it envisages and implements certain planning documents, as well as to bring normative acts from its jurisdiction. The MARD performs tasks related to development policy in water management, systematic solutions for the provision and use of water, protection of waters from pollution, water and watercourse regulation and protection against harmful effects of waters. In this respect, the MARD is responsible for the harmonization and implementation of the Water Framework Directive 2000/60 / EC, the Environmental Quality Standards Directive 2008/105 / EC, the Groundwater Directive 2006/118 / EC, the Urban Waste Water Directive 91 / 271 / EEC, Nitrate Directive 91/676 / EEC, the 2007/60 / EC Flood Directive, the Bathing Water Directive 2006/7 / EC and the Directive on Technical Specifications for Chemical Analysis and Water Status Monitoring 2009/90 / EC. The Water Directorate, as a body within the Ministry of Agriculture and Rural Development, from the point of view of water management, is the most important executive body in this field. It is evident from the jurisdictions established by the Law on Waters that this body should play a key role in the implementation of the same law and, in addition, be an expert service of the Government and the line ministry, and in certain segments to act with the attributes of the agency, that is, the regulatory and supervisory authority. Considering the enormity of all these activities, the Law also foresees that this body can provide professional planning and management tasks to specialized organizations, in accordance with the Law. The Ministry of Sustainable Development and Tourism (MSDT) through the Directorate for Environment and the Directorate for Utility Services is responsible for reporting on the quality of environmental segments, including water, that is, for utility activities, water supply and urban waste water treatment and treatment (Directive 91/271 / EEC), as well as the Marine Strategy Directive 2008/56 / EC. The Ministry of Health (MH), through the Institute for Public Health, which performs physical and chemical analyzes of water and microbiological testing of drinking water, is responsible for controlling and monitoring the safety of drinking water (Directive 98/83 / EC). The Ministry of Economy is responsible for the use of water for hydro-energy

	purposes. The Ministry of Transport and Maritime Affairs is responsible for the safety of maritime and inland navigation and for preventing and undertaking urgent measures in case of pollution of the sea from vessels. Other administrative bodies and institutions dealing with certain segments in the field of water management are: • The Environmental Protection Agency (EPA) is in charge of monitoring the state of the environment and conserving nature, collecting and updating data on the quality of all segments of the environment, including water and reporting to national and European institutions. • One of the activities of the Institute of Hydrometeorology and Seismology (IHMSS) is monitoring of the quality and quantity of surface and groundwater, the forecast of floods and monitoring of the hydrological situation, by giving warning to the institutions responsible for flood risk management. • The Public Enterprise for the Management of Maritime Goods is responsible for the management of the sea and marine areas. • The Inspection Department performs Inspection supervision through water management inspection (monitoring and implementation of the Water Law) and sanitary inspections (water safety control), while the safety inspection of the Bar and Kotor navigation, as part of the Directorate for Maritime Transport of the Ministry of Maritime Affairs and Transport, is in charge of protection It must be polluted from the vessel. • The Maritime Safety Administration, as a state administration body, carries out sea protection activities from pollution from vessels. • The Institute of Marine Biology, as the organizational unit of the University of Montenegro, monitors marine biodiversity. By the division of responsibilities in the Law, a significant part of the water management domain is located at the level of the local self-government unit. In principle, this division was effected by the division of waters carried out by that law into waters of importance for the State and waters of local significance.
Authority for Energy (one single, several, at different levels?)	- The Ministry of Economy - the energy sector; - energy efficiency sector; - mining and geological exploration sector; - Regulatory Agency for Energy (RAE) - independent, functionally independent and non-profit organization, which performs public powers according to the law, for the purpose of regulating the energy sector of Montenegro - Elektroprivreda Crne Gore (EPCG AD) - currently has the status of a public supplier of electric energy in Montenegro. - ZETA ENERGY DOO Danilovgrad - is the result of the conclusion of the Agreement on the Establishment of D.O.O. "ZETA ENERGY" in April 2010, which began operating in October 2010 when RAE issued a license for electricity production. Ownership structure: EPCG - 51% and NTE (Norway) - 49%. It's EPCG as the founding stake, entered two small hydropower plants ("Glava Zeta "and" Slap Zete") total power of 6.56 MW and 1,2 MW. - Crnogorski elektroprenosni sistem(CGES AD) - je izdvojen iz EPCG AD 2009. godine. Poslije dokapitalizacije CGES AD izvršene u januaru 2011. godine,

	vlasnička struktura krajem oktobra 2011. godine je: Država - 55,0%, operator prenosnog siste ma Italije (TERNA) – 22,1%, druga pravna i fizička lica – 22,9%. CGES AD ima dvije licence: za operatora prenosnog sistema i prenos električne energije. - The Montenegrin Electricity Transmission System (CGES AD) - was separated from EPCG AD in 2009. After the recapitalization of CGES AD made in January 2011, the ownership structure at the end of October 2011 is: State - 55,0%, transmission system operator Italy (TERNA) - 22.1%, other legal and physical persons - 22.9%. CGES AD has two licenses: for the operator transmission system and electricity transmission - Montenegrin electricity market operator (COTEE d.o.o.) - started after completion of founding a new company in August 2011, based on the decision of the Government of Montenegro in December 2010, and separated from CGES AD. The COTEE d.o.o. doing business like new legal and energy entity in 100% state ownership assistance. From December 2011, COTEE d.o.o. has a license for an electricity market operator - Coal Mine AD Pljevlja (RUP) is in mixed ownership, and its ownership structure at the end of December 2011 was: A2A - 39.5%, State - 31.1%, other legal entities and natural persons - 29.3% - Brown coal mine "Ivangrad" AD Berane - was privatized in 2007 by the company »Balkan Energy« d.o.o. from Greece. - In the oil and gas sector, where petroleum products and liquid Petroleum Gas (LPG) Montenegro imports completely. The main energy entities are: - Jugopetrol AD Kotor - Joint stock company for research, exploitation and oil and petroleum products. After the privatization carried out in 2002, the Greek company Hellenic Petroleum International AG became the owner of 54.5% of shares of the Company. - Montenegro Bonus d.o.o. Cetinje is a state-owned company engaged in the wholesale, trade and electricity supply of petroleum products. In addition, Montenegro Bonus d.o.o has been nominated for a gas transmission operator, and the Government of Montenegro has been responsible for the development part of the IAP gas pipeline through Montenegro. The Statistical Office of Montenegro (MONSTAT) has a very important role the role in the energy sector of Montenegro because is the official producer of energy statistics. MONSTAT is responsible for making the accomplished ones energy balances, while the competent Ministry of responsible for the development of planned energy balances.
Authority for Food/Agriculture (one single, several,	- Ministry of Agriculture and Rural Development - Directorate for Agriculture: Department for Plant Production and Inspection:

at different levels?)	i. Department of Plant Production ii. Inspection Supervision Department iii. Directorate for livestock breeding iv. Directorate for Quality Schemes and Land Policy - Biotechnical Faculty - involved in policy implementation (Livestock Selection, Animal Breeding Department, Dairy Laboratory and Plant Production Advisory Service).
Authority for Ecosystems (one single, several, at different levels?)	- Ministry of Sustainable Development and Tourism (has the highest competences) and under its aegis: - Environmental Protection Agency - Public Enterprise for National Parks. - Ministry of Agriculture and Rural Development. Responsible for management of protected areas in the coastal region: a large number of departments, administrative bodies, institutions and local authorities. Institutional context for marine protected areas needs to be considered from two aspects: responsibilities regarding Planning and Establishment of marine protected areas and responsibilities regarding their Management. Therefore, authorities are: - Ministry of Sustainable Development and Tourism (setting nature conservation policies, developing regulations, compliance with EU policies and legislation on nature protection, including coordination of the establishment of the Natura 2000 procedures, reporting to the European Commission, involvement of stakeholders, education and communication activities, plays a central role in the supervision of the spatial planning and tourism development), and within it: - Environmental Agency - National Parks of Montenegro (in charge of management on National Parks) - Public Enterprise for Coastal Zone Public Management of Montenegro (in line with recent changes in legislation,also in charge of management of protected areas) - Inspection Administration. Other relevant governing bodies and stakeholders: - Ministry of Agriculture and Rural Development - Ministry of Transport and Maritime Affairs - Ministry of Culture - Ministry of Education - Ministry of Science, within it: - The Marine Biology Institute in Kotor operates as a research institute

	within the University of Montenegro. Its main areas of work include: research of marine plants and animals researching and examining sea water chemistry; and periodically monitoring of the sea water quality. Local governments have an important role in the integrated management of coastal areas.

Table 9: Key assessing features in Montenegro

Integration of the Nexus sectors is included in the following table:

Recent regulation, strategies or plans	**ME**
Water integrates Energy	Hydropotential of the rivers is analized in the Water Management Strategy (2017) through the total hydropotential of the rivers and technical feasiblility. Technical hydro potential in Montenegro has been estimated (based on the hydroelectric potential along the main streams) to 4.1-5.0 TWh. The Water Management Plan is in developing phase and it will must include energetic aspect of the water use.
Energy integrates Water	Energy Development Strategy of Montenegro by 2030 integrates in details water resources, its potential as a renewable energy resources on the main rivers as well as on the small basins for the mini hydropower plants. The water management plan must be prepared in close cooperation with the energy sector, since it has to take into account the energy sector's ambition to valorize hydro potential through the construction of hydropower plants, as well as the relationship to the Water Framework Directive.
Water integrates Food/Agriculture	The Water Management Strategy of Montenegro analyzes required amount of water for irrigation of agricultural land.There is a discrepancy between the total agricultural land and the one currently used for agricultural production.
Food/Agriculture integrates Water	Strategy of Agriculture and Rural Development by 2014-2020 integrates the water. It analysis its availability but also numerous problems related to their use such as: discharge of waste water, excessive and irrational use, degradation of river flows and catchment areas due to the exploitation of mineral resources in river beds and ecosystems in catchment area which disturb national dynamics of hydrological processes. There is still no integrated water management system, and water issues have not been adequately integrated into the different sectorial policies. Due to a lack of networking and information systems, the exact state of play regarding hydrological and ecological parameters and their interrelation is not known. Moreover, information on the situation concerning water resources is relatively limited, unsystematic, and is has been obtained through the monitoring of standard chemical and physical parameters and data related to water supplies. Irrigation in Montenegro is a basic requirement and a prerequisite for the achievement of stable agricultural production. The water used for irrigation in Montenegro is of quite good quality. The Water Administration manages waters and water resources. MARD, together with the

	Chief Water Inspector is in charge of controlling the enforcement of the Law on Waters.
Water integrates Ecosystems	Priority objectives in the water sectors: - Analysis of the characteristics of river basins (identification of water bodies of surface water and ground water, artificial and heavy modified water bodies, the pressures on surface and ground water, the economic analysis of water use), - Establish a register of protected areas, (https://www.unece.org/fileadmin/DAM/env/Water_Convention_Sava_River_Workshop/7.section_3_dragana_djukic.pdf) - Improve monitoring of waters - The convention on Cooperation for the protection and sustainable use of the Danube river was implemented in October 2008. - Water resources planning and management is also characterised by weak integration of requirements to protect biodiversity (an example is issuance of concessions for the extraction of materials from river courses).
Ecosystems integrates Water	Decrease water pollution (including excess nutrients and eutrophication) and pollution of air; ensure safeguarding of biodiversity “hot spots” from pollution Protect and improve use of ecosystems services, in particular through integrated river basin management and integrated forest management Improve horizontal cooperation and coordination between sectors in relation to NBSAP; mainstream NBSAP targets and indicators into other relevant national strategies Mobilisation of funds for NBSAP implementation (different sources, including public funding through other sectoral strategies and action plans, as well as private sources)
Energy integrates Food/Agriculture	Strategija razvoja energetike samo dijelom integriše poljoprivredu I to kroz analizu predviđene potrošnje energije do 2030 godine, u kompletu sa građevinarstvom I neenergetskim rudarstvom.
Food/Agriculture integrates Energy	
Energy integrates Ecosystems	Meet the needs for energy by minimizing costs and environmental impact; increased energy efficiency, increased security and quality of the electricity power supply. Least success with mainstreaming biodiversity was achieved in energy sector and spatial planning. Energy strategy (adopted document as well as the draft updated strategy) and spatial plans for development of large energy facilities have failed to provide for adequate assessment of important biodiversity in proposing specific energy development projects. This

	in particular refers to planned utilisation of hydropower.
Spatial Planning integrates Ecosystems	Similarly, detailed spatial plans in the coastal region have designated excessive construction areas without due considerations of impacts future urbanisation allowed through such planning could have on valuable coastal ecosystems.
Ecosystems integrates Energy	Example of vulnerability assessment prepared through the Coastal Area Management Programme to aid preparation of the coastal spatial plan is especially important. Similarly, actions were undertaken to improve availability of biodiversity baseline data in cases of planning large energy generation capacities (hydropower plants on Morača river)
Food/Agriculture integrates Ecosystems	Sustainable resource management, stable and safe food supply, improved standard of living for the rural population. Forestry: More efficient use of forest resources, ensuring long-term resistance and productivity of forests. Environment: Nature and biodiversity protection, minimizing air pollution, protection of water quality. The Strategy for the Development of Agriculture and Rural Areas by 2015-2020 considers natural conditions and the environment (biodiversity, water, the sea and coastal areas, land and mineral resources). Agro-biodiversity and genetic resources for food and agriculture are among the most significant components of biodiversity; this includes all animals, plants and microorganisms that can potentially be used for food and agriculture.
Ecosystems integrates Food/Agriculture	Ensure and maintain genetic diversity of cultivated plants and farmed animals Implementation of instruments to ensure access to genetic resources and equitable sharing of benefits (ratification and implementation of Nagoya Protocol). In line with Aichi targets, national objective on the share of protected areas is set at 17% by 2020. Mainstreaming of biodiversity in fishing and hunting strategies and plans is not satisfactory and is to a large degree impeded by lack of reliable baselines data

Table 10: Integration of the Nexus sectors

The integration of climate change in the Nexus sectors is reflected below:

Climate resilience integration in recent regulation, strategies or plans	**ME**
Water	The Water Management Strategy only treats in principle the problem of the impact of climate change on water resources. As this is a complex problem, future water management documents are expected to study more in detail the effects of climate change on the regime and balance of water resources.
Energy	Energy Development Strategy of Montenegro by 2030 integrates climate change through the programme of monitoring of the fulfilment of the international obligations and programme for coal consumption reduction. The key document the National Strategy for Climate Change by 2030, which is adopted in September 2015, defines climate policy, establishes the guidelines and a roadmap towards climate-resilient, low-carbon society. The initial assessment of the policy compatibility and strategies relevant to climate change compatibility with EU requirements in this field indicates that the local strategic and legal framework deal with climate change issues to some extent.

	In order to harmonize . the national with the EU climate policies and regulations, part of the EU climate legislation has already been transposed into national legislation. Mitigation of climate change in energy sector is analysed in the National Strategy for Sustainable Development NSSD.
Food/Agriculture	Strategy of agriculture and rural development by 2014-2020 considers climate change as an impact on air quality, fertility of land, erosion, usage and water availability. The Strategy stated that the agricultural sector is responsible for 97% of all of the total nitrogen sub-oxide emissions and provides the best way for ammonia emissions reduction. It emphasizes the lack of systems for the collection of agricultural waste (with the exception of a small number of individual households) that leads to uncontrolled levels of GHG emissions.
Ecosystems	Action Plan of the National Biodiversity Strategy 2010 – 2015 recognize the problem of climate change. One of its strategic target is that specific mechanisms and the impact of climate change needs to be explored thoroughly, and particularly on sensitive areas/ecosystems (primarily marine and Alpine), and to propose measures for their mitigation.

Table 11. Integration of the climate change in the Nexus sectors

Elements of resource efficiency as they are reflected in the Nexus policies are:

Resource efficiency considerations in recent regulation, strategies or plans	**ME**
Water efficiency	Water Management Strategy has predicted, as one of the key issues in the efficient use of water resources, to reduce losses in public water supply systems to less than 30%. When processing data from utility companies in charge of water supply, there are losses that represent the difference between the affected quantity of water and the one that is invoiced. In 2013, 63,906 601 m3 of water was repaired in the water supply system of the municipalities of the central and northern regions, of which 26 919 978 m3 were invoiced, namely 5 169 002 m3 of water to legal entities and 21 750 976 m3 of water to natural persons . Total losses amounted to 57.9%. The largest losses were recorded in the water supply system Cetinje, about 84%. Reduction of losses to less than 30% could lead to additional amounts of water and reduce the need for overexpoliting from existing water resources or the formation of new ones, which contributes to the rationality of using water resources from the aspect of sustainable development.
Water reuse	Water Management Strategy did not include water reuse.
Renewable energy	The Energy Development Strategy of Montenegro by 2030 greatly focuses on renewable energy sources. The national objective of using renewable energy

sources	(NCOIE), which represents the share of gross final energy consumption from RES 24 in total gross final energy consumption (BPFE) 25 in Montenegro, was established by the Ministry of Economy. The obligations to implement Directive 2009/28 / EC on the promotion of renewable energy sources and the national objective of the share of renewable energy sources for the member economies of the Energy Community are adopted. According to the above decision, the national target of using renewable energy by 2020 is 33%. According to the energy balances, in 2020, 4970 GWh of energy can be charged for fulfilling the NCOIE. This represents the achievement of the RES ratio of 45.9%, and represents an exceeding of the target by 1399 GWh. According to the Strategy, Montenegro is significantly above the NCOIE and after 2020, but the percentage is declining.
Energy efficiency	It is integrated in the Energy Development Strategy of Montenegro by 2030 through its increase in existing generation, transmission and distribution facilities (supply side). It analyse revitalisation of Hydropower plants: Piva, Perucica, Pljevlja, small HPPs, undersea cable for connection with Italy and with it related projects construction of new substations and transmission lines The increase of the energy efficiency (demand side) encompasses programme of measures by sector (households, public sector, commercial services/industry, transport), programme of the investment Projects of EE in public lighting, water supply systems and waste water treatment and other utility services. Under the Programme of informing, education and training efficient use of energy play a key role in achieving the objectives of improving energy efficiency and reducing energy consumption. This Strategy also analyse the cleaner and more efficient energy production from the fossil fuels . Implementation focus of national energy efficiency policy in Montenegro is on public sector. Actual barriers that slow down or impede the implementation of energy efficiency measures in public sector are relatively big (inadequate attitude towards energy consumption and expenses for the energy,lack of motivation of employees in terms of achieving energy savings, impossibility to allocate budgetary funds to energy efficiency projects without complex procedures, inexistence of energy management systems, inexistence of systemic audit of housing condition, as well as inexistence of the information regarding overall energy consumption of housing stock under the jurisdiction of the state and other).
Land/soil conservation	The Strategy for the Development of Agriculture and Rural Areas by 2015-2020 considers available resources and the environment. The land cover of Montenegro is quite diverse and is characteristic for heterogeneous system units which occur due to a variety of different conditions: the basic substratum of different geological and lithological features, specific land relief forms, changeable climate conditions, and land use. Soil has a low absorption level and in turn a low retention capacity for humidity and nutrients.

	The surface area of agricultural land in Montenegro amounts to 309,241 ha, which represents 22.4% of the entire territory. Despite having significant land resources, Montenegro's land is divided up among many family holdings. Thus, 31.6 % of the total amount of cultivated agricultural land comprises small land parcels that have an area of no more than 0.5ha. More than half of the holdings (54.1 %) cultivate just 0.10 to 1.00 ha of agricultural land. As the territory with the highest level of water sediment in Europe, due to an unfavourable level of water balance, almost 35% of the soil in Montenegro suffers from water shortage. Around 51,000 ha of land are suitable for irrigation, yet only 15-17% of this is actually irrigated. Whilst the adequate usage of available land resources are of great significance for the development of agriculture in Montenegro, the majority of the above listed issues require joint action and coordination with various ministries and institutions at both national and local levels, and also should include input from local-self-governments. Thus, the Strategy for the Development of Agriculture and Rural Areas must be implemented in line with other strategies of the Government of Montenegro such as the Strategy for Sustianable Development and the Strategy for the Regional Development of Montenegro. One example of such cooperation can be seen in the joint efforts of the Ministry of Sustainable Development and Tourism, the Ministry of Agriculture and Rural Development and the UNEP Office in Vienna. Together, they have started to work on a project entitled 'Support for Montenegro for the Development of a National Action Program'. This was aligned with the UNCCD 10-Year Strategy for Enhanced Implementation and UNCCD (MNAP) carried out the reporting process. The aim of the National Plan is to identify factors that have an impact of desertification and pollution as well as appropriate measures to fight against desertification. The aim is to adopt the National Plan over a period of six years. An action plan, along with a group of measures and activities for the implementation of the National Plan has been defined, as have deadlines for execution and responsible subjects.
Food waste reduction	The National Strategy of Sustainable Development NSSD stated that separation of domestic consumption of materials from gross added values in agricultural sector did not happen, and that indicates the inefficient and unsustainable consumption in agricultural sector. NSSD concludes that this sector should be one of priorities for resource efficiency. Consequently,additional measures and processes are needed that would establish certain standards in this sector from resource efficiency aspect. The Law on Waste Management regulates the types and classification of waste, planning, conditions and manner of waste management and other issues of importance for the official implementation of sustainable, safe and environmentally friendly waste management. But it does not treat specifically food waste and its reduction. According to estimations from the Waste Management Strategy of Montenegro by 2030, quantities of waste to be generated in the forthcoming period will increase despite continual efforts to reduce quantities of generated waste. The reason for such estimation lies in the fact that living habits in Montenegro and production and consumption models have not yet come to

	life (linear economy versus circular economy), which would provide the basis for expectation that in the coming, relatively short time period such dynamic changes could occur and lead to reduction of generated waste. It is estimated that quantities of waste to be generated in the period until 2036 will be constantly increasing by 2% annually in local self-government units in which population growth is expected.

Table 12: Elements of resource efficiency as they are reflected in the Nexus

Nature based solutions are reflected as follows in the strategies and plans:

Considerations on nature-based-solutions in recent regulation, strategies or plans	**ME**
Water	In the water sector there are no significant considerations on the nature-based-solutions in recent regulation, strategies or plans.
Energy	NSSD until 2030 analysed it as resource efficient and in the context of climate change mitigation. Montenegro Development Directions 2013-2016 considers sustainable growth of agriculture, forestry, energy, environment, transport, housing and construction.
Food/Agriculture	Strategy for the Development of Agriculture and Rural Aresas 2015-2020, NSSD until 2030 enhancing sustainable agriculture
Ecosystems	NSSD until 2030 considers that the urgent revision is needed, defining sustainable management models, speed up the process of proclamation of new protected areas, especially in marine environment and that Ecologically important sites should be put under appropriate protection regimes in accordance with international guidelines (e.g. Aichi biodiversity targets and global sustainable development goals 14 and 15). In addition, it is necessary to develop a system of protection measures and mechanisms outside the protected areas. It is important to work on the development of appropriate capacities for the protected areas management, especially marine ones, taking into account that there is no relevant experience in that respect in Montenegro: - Conservation of forests as one of most important ecosystems, ecological reconstruction, improvement of forests health status, and development of forest management system; - To increase the utilization level of waste biomass used as energy source (such as pellets and similar forms), also to integrate forest sector into rural development; - Halting of degradation of values of biodiversity, water, sea, air and soil - One specific problem in forest sector is forest fires; these have become more frequent in recent years, as has the drying out of certain wood species caused by plant pests and diseases. Strategy for the Development of Agriculture and Rural Areas 2015-2020 considers

	the nature based solutions through the sustainable development.

Table 13: Nature based solutions that are reflected in the strategies and plans

3.2 Nexus-related initiatives

3.1.1. Climate change adaptation

- Government of Montenegro adopted the National climate change strategy by 2030 on 17th September 2015
- Definition of the long term strategic framework with Action plan
- Limited consideration of Adaptation to climate change due to strong focus on mitigation and EU acquis
- INDC without adaptation to CC
- UNFCCC process- Second National Communication (May 2015) and First Biennial update report (January 2016)
- Draft National Environment Approximation Strategy (NEAS)- Fulfilment of the obligation of the requirement for opening of the negotiation chapter 27.

- INDC- without adaptation to climate change component

Cc Adaptation actions in Montenegro:

- CC Vulnerability and impact assessments done through two National Communications to UNFCCC- main source of knowledge in this field.
- Coastal Area Management Programme of Montenegro (CAMP) - CC vulnerability assessment of coastal region of Montenegro
- Climate Change Adaptation in Western Balkans (GIZ)- Draft Strategy for adaptation to climate change for Podgorica Capital city (April 2016)
- ECRAN- Working group on Adaptation to Climate Change
- Climate change adaptation in the Western Balkan mountains (UNEP) – Vulnerability and impact assessment for mountains region

Challenges:

- SEE and Med - regions susceptible to CC impacts
- Missing comprehensive strategy framework for CC adaptation
- Project driven adaptation actions
- Missing Financial support mechanisms
- Lack of institutional and administrative capacities for planning, implementation, monitoring and evaluation in this field
- Needs:

- National Strategy for Adaptation to CC with Action plan
- Local plans for Adaptation to CC with integration of DRR and Civil protection
- Introducing of Financial support mechanisms for most vulnerable sectors
- Continuation of integration of CC Adaptation into sectorial policies and plans
- Enhancement of linkages between since-policy-implementation
- Increased public awareness and participation in policy development

Institutional framework:

- Ministry of Sustainable Development and Tourism: GD for Climate Change
- Institute for Hydrometeorology and Seismology- IPCC focal point
- National Council for Sustainable Development and Climate Change
- WG on mitigation and adaptation to climate change.

3.1.2. Nexus-related overview of Transboundary basins/ aquifers

As already mentioned, **95 %** of the water courses in Montenegro are formed in its territory and flow to other economies. There are three transboundary river basins: the Sava (as part of the Danube), the Bojana River (Adriatic sea) and the Trebišnjica river basin (Adriatic sea). It should be noted that Montenegro is a member of the International Sava River Basin Commission (ISRBC). As part of the ISRBC, Montenegro cooperates with the other riparian economies at the technical level and exchanges hydrological and meteorological data from the basin.

In the basin of the river Bojana, Montenegro is working on several projects related to cooperation with the other riparian economies (Albania, The Former Yugoslavian Republic of Macedonia, Kosovo*):

1. ***Adaptation to Climate Change in Cross-border Flood Risk Management in the Western Balkans*** (Albania, Montenegro, Kosovo*, The Former Yugoslavian Republic of Macedonia)- German Technical Cooperation;
2. GEF Project ***"Enabling Transboundary Cooperation and Integrated Water Resources Management in the Extended Drin River Basin"***

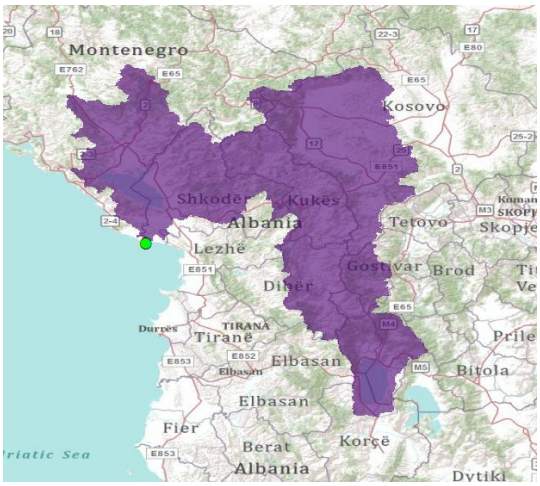


Figure 29: Extended Drin River Basin

In the Black Sea basin, the project "Water Resources Management of the Drina River Basin (DRB)" is funded by the World Bank. The project is in the Implementing stage (WB Contract No. 8,005,176).

Figure 30. The Sava river catchment area

The project “Strengthening the Capacities for Implementation of the Water Framework Directive in Montenegro”, which started on February 27th 2017, will last for 3 years. The project is financed by the European Union (Contract No.383-638 EuropeAid/138151/DH/SER/ME). The project will support the establishment of typology for water bodies in Montenegro.

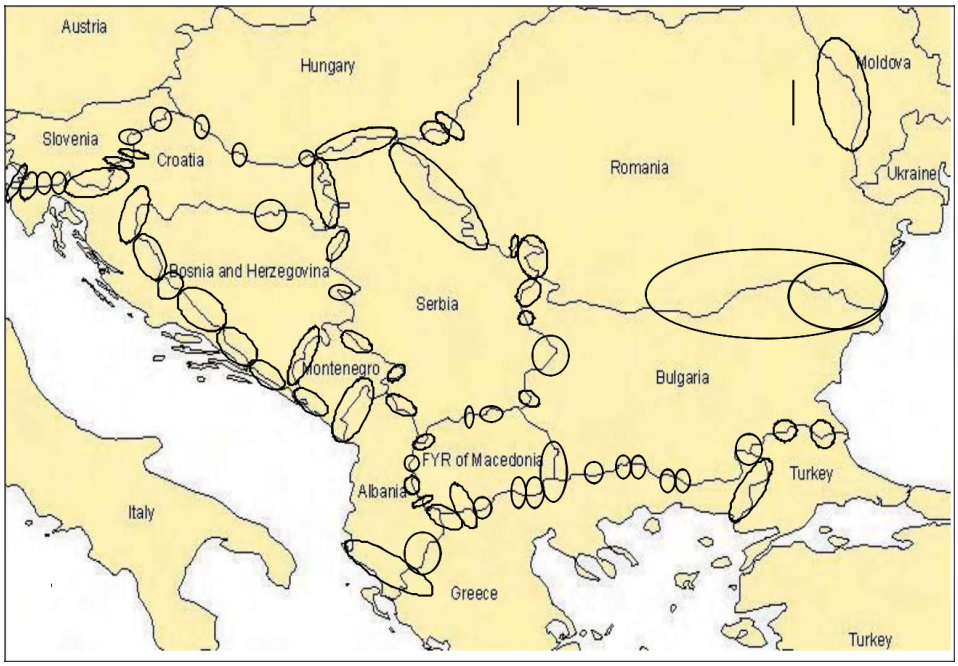


Figure 31: Transboundary basins/ aquifers

Trans boundary basins and aquifers identified in the SEE2020 region relevant for Montenegro are presented as follows:

Transboundary river basins	Aquifers	Economies covered
Neretva	Neretva Right coast, Trebišnjica/ Neretva Left coast (Bosnia and Herzegovina, Croatia), Bileko Lake (Bosnia and Herzegovina, Montenegro)	Bosnia and Herzegovina, Croatia, Montenegro
Drin	Beli Drim/Drini Bardhe (Albania, Kosovo*), Prespa and Ohrid Lakes (Albania, Greece, The Former Yugoslav Republic of Macedonia), Skadar/Shkoder Lake, Dinaric east coast aquifer (Albania, Montenegro)	Albania, Greece, Kosovo*, The Former Yugoslav Republic of Macedonia, Montenegro
	Dinaric Littoral (West Coast)	Croatia, Montenegro
	Metohija	Kosovo*, Montenegro
	Pester	Montenegro, Serbia
	Korab/Bistra – Stogovo, Jablanica/Golobordo	Albania, The Former Yugoslav Republic of Macedonia
	Mourgana Mountain/Mali Gjere	Albania, Greece
Danube	South Western Backa/Dunav aquifer (Serbia, Croatia), Northeast Backa/ Danube -Tisza Interfluve or Backa/Danube-Tisza Interfluve aquifer (Serbia, Hungary)	Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldavia, Montenegro, Romania, Serbia, Slovenia, Switzerland, Ukraine
Sava	Srem-West Srem/Sava (Croatia, Serbia), Posavina I/Sava, Kupa, Pleševica/ Una (Bosnia and Herzegovina, Croatia), Macva-Semberija (Bosnia and Herzegovina, Serbia), Lim (Montenegro, Serbia), Tara massif (Bosnia and Herzegovina, Serbia)	Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Slovenia
Velika Morava	Stara Planina/Salasha Montana (Bulgaria, Serbia)	Bulgaria, The Former Yugoslav Republic of Macedonia, Montenegro, Serbia

Table 14. Trans boundary basins and aquifers have been identified in the SEE2020 region relevant for Montenegro[xxxv]

3.1.3. Turning Nexus trade-offs to synergies

In order to avoid trade-offs and foster synergies between the different Nexus policies, regulation, strategies and plans shall promote an early and wide integration of the aspects and concerns of the related Nexus sectors in own developments.

Recent policy developments in the Water and Food/Agriculture sectors show a higher integration of objectives and targets of the other sectors, than Energy or Ecosystems, being the latter focused on ways to minimize the negative impacts of economic development on biodiversity.

	Montenegro
Water integrates Energy	high
Water integrates Food/Agriculture	high
Water integrates Ecosystems	low
Energy integrates Water	low
Energy integrates Food/Agriculture	medium
Energy integrates Ecosystems	low
Food/Agriculture integrates Water	high
Food/Agriculture integrates Energy	no
Food/Agriculture integrates Ecosystems	high
Ecosystems integrates Water	low
Ecosystems integrates Energy	medium
Ecosystems integrates Food/Agriculture	medium

Table 15: Integration of Nexus aspects in recent regulation, strategies or plans for the Nexus

Explanation: “high” indicates identification of synergies, “medium“ indicates identification and assessment of conflicts, risks and constraints; “low” indicates inclusion of concerns, needs or supply aspects; and “no” none of the previous (only textual mentioning). Note that a more detailed analysis can lead to a higher scoring.

3.1.4. Integration of climate resilience aspects in sector policy, regulation and management

Climate change resilience can be fostered by a varied set of measures addressing aspects like water scarcity, droughts or floods, temperature increase, heat waves, plagues and diseases, and ranging from efficiency increases to changes in production or management. Lists of options for action are usually included in the reporting to the UNFCCC.

Overall, climate change resilience has only partially been included in the sector-specific strategies/plans of the SEE2020 economies including Montenegro. This can lead to situations where the sectors are not ready to deal appropriately with climate change.

	Montenegro
Water	no
Energy	yes
Food/Agriculture	no
Ecosystems	yes

Table 1 Overview on the integration of climate resilience in recent regulation, strategies or plans in Montenegro

Explanation: "yes" indicated climate change being integrated; and "no" none of the previous (only textual mentioning).

In Montenegro the following integration has been identified:

The Water Management Strategy only treats in principle the problem of the impact of climate change on water resources. As this is a complex problem, future water management documents are expected to study more in detail the effects of climate change on the regime and balance of water resources. The key document, the Strategy for Climate Change by 2030, which was adopted in September 2015, defines climate policy, establishes the guidelines and a roadmap towards climate-resilient, low-carbon society. The Strategy for Agriculture and Rural Development 2014-2020 considers climate change as an impact on air quality, fertility of land, erosion, usage and water availability. The Action Plan of the Biodiversity Strategy 2010 – 2015 recognizes the problem of climate change. One of its strategic targets is that specific mechanisms and the impact of climate change needs to be explored thoroughly, and particularly on sensitive areas/ecosystems (primarily marine and Alpine), and to propose measures for their mitigation.

3.1.5. Integration of resource use efficiency aspects

Resource efficiency is an approach to produce more from less input, use resources in a sustainable way, and manage them more efficiently throughout their life cycle. Circular economy is an approach aiming to keep resources within the economy when products no longer serve their function so that materials can be used again and therefore generate more value (Di Maio et al., 2017); and thereby supports resource use efficiency.

Resource use efficiency is included in the competencies of the sector administrations in place. However, resource efficiency seems to be so far only relevant for the energy sector, and some minor consideration is given to water use efficiency in irrigation, but not to water reuse, as a component of circular economy. Additionally, energy efficiency initiatives are often secondary when compared with the generation of new renewable energy.

	Montenegro
Water efficiency	yes
Water reuse	no
Renewable energy sources	yes
Energy efficiency	yes
Land/soil conservation	low
Organic farming	no
Food waste reduction	low

Table 27: Overview on the resource efficiency considerations in recent regulation, strategies or plans in Montenegro[xxxvi]

Under the 'Sustainability Eventually' scenario, the SCENES project proposes significant water abstraction reductions for the electricity and domestic sectors as targets for 2030:

	Kosovo*	Montenegro	Serbia
Electricity sector	Decrease >50%		
Manufacturing sector	Decrease <50%		
Irrigation	No/slight change		
Domestic	Decrease >50%		

Table 38: Percentage change in water abstractions for Montenegro as per the 'Sustainability Eventually' scenario under the SCENES project

The Water Management Strategy aims, as one of the key issues in the efficient use of water resources, to reduce losses in public water supply systems to less than 30%. The Energy Development Strategy of Montenegro by 2030 greatly focuses on renewable energy sources. The focus of implementation of the Economy level energy efficiency policy in Montenegro is on the public sector. Actual barriers that slow down or impede the implementation of energy efficiency measures in the public sector are significant. The Strategy of Sustainable Development stated that separation of domestic consumption of materials from gross added values in the agricultural sector is not achieved, and concludes that this sector should be a priority for resource efficiency.

3.1.6. Consideration of nature-based solutions

Nature-based solutions are not reflected as a priority within the assessed strategies/plans, and are usually not even reflected.

	Montenegro
Water	no
Energy	no

Food/Agriculture	yes
Ecosystems	yes

Table 49: Overview on the consideration of nature-based-solutions in recent regulation, strategies or plans in Montenegro

The following relevant details for Montenegro are highlighted:

- The Strategy for the Development of Agriculture and Rural Areas 2015-2020 considers the nature-based solutions through the sustainable development.

3.2. The role of international action

International agreements, decisions or actions can influence the way that SEE2020 economies including Montenegro address the Nexus. There are three main pathways:

International agreements, decisions or actions can influence the way that SEE2020 economies including Montenegro address the Nexus. There are three main pathways:

- By ratification of international agreements or conventions and the implementation of corresponding action plans;
- Via the process of EU accession, and the subsequent changes in institutions, regulation, planning, financing and management; and
- By means of projects or initiatives developed with the support or involvement of international bodies.

Regarding the first of the three elements, the economy has ratified a large number of Nexus-relevant agreements and conventions. In the frame of this study, the implementation details have not been assessed.

	Montenegro
Convention on Environmental Impact Assessment in a Transboundary Context	2009
Protocol on Strategic Environmental Assessment	2009
Multilateral Agreement among the Economies of South-Eastern Europe for implementation of the Convention on Environmental Impact Assessment in a Transboundary Context	2008
Rio Convention on Biological Diversity	2006
Convention on International Trade in Endangered Species of Wild Fauna and Flora	2007
Convention on Conservation of Migratory Species of Wild Animals	2009
Convention on the Conservation of European Wildlife and Natural Habitats	2016
Helsinki Convention on Watercourses and International Lakes	2014
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat	2016

Aarhus Convention on access to information, public participation in decision-making and access to Justice in environmental matters	2009
Protocol on pollutant release and transfer registers (to the convention on public participation	2009
United Nations Framework Convention on Climate Change	2006
Kyoto Protocol	2007
Energy Community Agreement	2007
WHO Framework Convention on Tobacco Control	2006

Table 20: International multi- or bilateral agreements/conventions undersigned by Montenegro in the different Nexus fields (indicating the year of ratification/adoption)

The following table provides an overview on 29 initiatives identified and shows that these initiatives address usually several of the Nexus sectors, and with a strong aspect of capacity building/institutional set-up. In several of the initiatives, resource efficiency, nature-based solutions and climate change adaptation have been addressed. However, this Report does not aim for a full review of the previous studies, thus uncertainties are marked in Table 21.

Indicating the economy involved and which Nexus elements are being addressed. This table includes also information on which Nexus-relevant key policies the initiative has been active.

Institution	Start/End	Nexus-related initiative	Economy	Nexus sectors					Policies		
			Montenegro	Water	Energy	Food	Ecosystems	Institutional capacity building	Resource efficiency	Nature-based solutions	Climate resilience
GIZ	2008-15	Open regional fund – Energy Efficiency	x	?	x			x	x		?
World Bank	2012-15	Danube Region Water Supply and Wastewater Sector Capacity Building Program	?	x	?			x		?	?
GIZ	2012-17	Protection and sustainable use of biodiversity in the territory of Lakes Ohrid, Prespa and Shkodra	x	x			x	x		?	?
World Bank	?	Green Growth Strategy		x	x	x	?	x	?	?	?
EU?	2014-20	IPARD	x	?	?	x	?	?	?	?	?
WWF	2009-?	Activities on establishing Natura 2000	x	?	?	?	x	x	?	?	?
UNDP/GEF	2010-14	DIKTAS: Protection and Sustainable Use of the Dinaric Karst Aquifer System	(x)	x	x		x	x	x		X
UNECE	-2017	Assessment of the water-food-energy-ecosystems nexus and benefits of transboundary cooperation in the Drina River Basin	x	x	x	x	x				

Table 21: Overview on the current Nexus-related initiatives

3.2.1. Nexus approach in the transboundary water management

The following transboundary basins and aquifers have been identified in the economy and region:

Transboundary river basins	Aquifers	Economies covered
Neretva	Neretva Right coast, Trebišnjica/ Neretva Left coast (Bosnia and Herzegovina, Croatia), Bileko Lake (Bosnia and Herzegovina, Montenegro)	Bosnia and Herzegovina, Croatia, Montenegro
Drin	Beli Drim/Drini Bardhe (Albania, Kosovo*), Prespa and Ohrid Lakes (Albania, Greece, The Former Yugoslav Republic of Macedonia), Skadar/Shkoder Lake, Dinaric east coast aquifer (Albania, Montenegro)	Albania, Greece, Kosovo*, The Former Yugoslav Republic of Macedonia, Montenegro
	Dinaric Littoral (West Coast)	Croatia, Montenegro
	Metohija	Kosovo*, Montenegro
	Pester	Montenegro, Serbia
Danube	South Western Backa/Dunav aquifer (Serbia, Croatia), Northeast Backa/ Danube -Tisza Interfluve or Backa/Danube-Tisza Interfluve aquifer (Serbia, Hungary)	Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldavia, Montenegro, Romania, Serbia, Slovenia, Switzerland, Ukraine
Sava	Srem-West Srem/Sava (Croatia, Serbia), Posavina I/Sava, Kupa, Pleševica/ Una (Bosnia and Herzegovina, Croatia), Macva-Semberija (Bosnia and Herzegovina, Serbia), Lim (Montenegro, Serbia), Tara massif (Bosnia and Herzegovina, Serbia)	Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Slovenia
Velika Morava	Stara Planina/Salasha Montana (Bulgaria, Serbia)	Bulgaria, The Former Yugoslav Republic of Macedonia, Montenegro, Serbia

Table 22: Transboundary river basins and aquifers in the economy

Out of the above list of transboundary river basins or aquifers, those that are transboundary within the SEE2020 economies have been further assessed regarding their Nexus-related conflicts, trade-offs and actions to overcome them, taken at the transboundary water management level:

Transboundary river basins or aquifer	Nexus-related challenges	Transboundary actions taken or planned	Nexus addressed
Sava, incl. Macva-Semberija (Bosnia and Herzegovina, Serbia), Lim (Montenegro, Serbia), Tara massif (Bosnia and Herzegovina, Serbia)	Hydropower generation, agriculture and industry are the main economic sectors, sharing the major part of the available water resources in the sub-basin. The construction of water regulation structures and weirs at its tributaries; drainage networks, and flood protection systems, in combination with water abstractions, have caused hydrological and morphological alterations, including disconnection of adjacent wetland/floodplains. Interruption of river and habitat continuity and loss of wetland areas in the lower-middle and lower Sava areas are among the impacts. Organic, nutrient and hazardous substances pollution are also important pressure factors. Regarding Macva-Semberija, local and moderate nitrogen and pesticides from agriculture are reported (Serbia, Bosnia and Herzegovina); no water quantity problems. Regarding the Lim aquifer, 12/ <25% of the total abstraction is for agriculture. Regarding the Tara massif aquifer, moderate to strong environmental impacts are reported related to the Bajina Basta reversible hydropower plant system (Serbia).	Sava River Basin Management Plan. Sava River Basin Flood Risk Management Plan. The Geographical Information System, the River Information Services (for the improvement of navigation safety), and the Flood Forecasting and Early Warning System were prepared by 2012. 1. Development of the Hydrological Model for the Sava River Basin (SRB) in August 2015 as a product of the World Bank WPP, with external contribution. 2. Guidance note on adaptation to climate change for flooding, hydropower, navigation, agriculture, and economic evaluation in August 2015 (WB WPP) when is also accomplished the final report on Water and Climate Adaptation Plan for the SRB. 3. The project in 2017: "Outline of the Climate Adaptation Strategy and basin-wide priority measures for the SRB" supported by International Office for Water (IOWater). The main project deliverable was the report on Outline of the Climate Change Adaptation Strategy and priority measures for the SRB. The Accident Emergency Warning System is in place. Cooperation among the Parties to the FARSB through the ISRBC represents the most advanced effort of its kind in the South-Eastern Europe, Montenegro has already been approached by the ISRBC for integration. However, Montenegro is not a Party of the FASRB as it is not riparian economy. Cooperation between ISRBC and Montenegro has been based on MoU that was signed in Belgrade on December 9,2013[37]. Regarding Macva-Semberija, groundwater abstraction regulation and quantity monitoring, protection zones, and	Sava river aspects have been addressed in the RBMP. No information on actions on aquifers.

		good agricultural practices used and effective, water use efficiency, public awareness, wastewater treatment need to be applied. For the Lim aquifer, abstraction management, protection zones and vulnerability mapping for land use planning need to be applied, together with monitoring of groundwater quantity and quality. For the Tara massif aquifer, groundwater abstraction management and quantity monitoring in use needs improvement. An integrated monitoring system is needed.	

Table 23: Nexus-relevant challenges and corresponding transboundary actions in river basins and aquifer

4. Conclusions

The economic development in Montenegro shows a gross economy income tendency to increase, although it is still below the period 2004-2008. Poverty is still relevant, with the biggest poverty rates in households with six members, and least in households which have as head employed persons or pensioner. The employment rate linearly increases from the 2010 (22.6%) to the 2016 (28.6%). The governmental budget is mostly in deficit during the period 2003-2017, although it tends to increase from the last three years (2015-2017). It was in surplus only three years (2006-2008). The external debt reached 53.1% of GDP in 2016 what is the highest since 2003, with the minimum in 2008 (15.6%). Export slowly decreases while import increases; while in 2003 the import was 2.3 times higher than export, in 2016 it reached the value of 5.8 times. The key import partners from Europe are Germany, Italy and Greece; and the largest import in SEE region is from Serbia, followed by Bosnia and Herzegovina, a relation similar for the export.

Key branches of industrial production in Montenegro include electricity production, mining and the metal industry. The most important branches of the metal industry are the production of aluminium and steel. Economic development in Montenegro until 1990 was characterized by intensive industrial production and industry's share in the gross domestic product (GDP) was about 30% until 1991. Since that time there has been a continuous decline in industrial production and in 2011 the level of manufacturing as represented in GDP was only about 5%.

The volume of water abstractions has stabilized at around 110 mil m3/yr, with a total delivered and water consumption of around 50 mil m3/yr, and a big difference because of losses in the public water supply systems. Urban supply uses 70% and for industry, agriculture and other 30% of the delivered water. For the production of energy, there is no data on the amount of water used. Groundwater is mainly used for irrigation.

There are two important sources of energy which have been explored so far in Montenegro - hydro-electricity (with a technical potential of 14.1-5 TWh) and coal. Concerning other renewables, technical wind potential has been estimated as being approximately 900 GWh/yr; the potential of solar radiation could be about 20 PWh/yr and the estimated average consumption of firewood in 2008 was 560 GWh/year, and this is expected to increase to 620 GWh/yr by 2030.

During the period 2006-2015, Montenegro's Ecological Footprint increased for 45% from 2.7 to 3.9 gha/person, while its biocapacity remained almost constant (shifting from 2.70 to 2.67 gha/person). In 2015, Montenegro was characterized by an ecological deficit as its biocapacity was able to satisfy around 70% of the overall demand for resources and services of its residents. The assignment of roles for managing biodiversity data with an

appropriate institutional set-up is generally defined, but lacks precise procedures for data flow between governmental institutions and is therefore inappropriate for assessing the Nexus trade-offs.

Regarding the institutional set-up, and on the positive side, there is one line-ministry for food/agriculture and water affairs (Ministry of Agriculture and Rural Development - MARD). However, other Nexus coordination institutions or instruments are not existing or – as the Water Council – not operational.

The consideration given by the Water Management Strategy (2017) to energy and food/agriculture is high, as the sector requests have been incorporated; and this happens vice versa for the Strategy of Agriculture and Rural Development 2014-2020 regarding water and biodiversity. However, further strategic planning of the Nexus remains weak, and it is unclear if synergies have been identified and operationalised in practice.

Climate change resilience has been incorporated in the energy and ecosystem strategies, whilst this approach is (yet) lacking for water and food/agriculture. On the positive side, it can be noted that (domestic) water and energy efficiency, as well as renewable energy sources have been incorporated in the planning. Nature-based solutions are included in the Strategy for the Development of Agriculture and Rural Areas 2015-2020.

The following region-specific Recommendations for Nexus synergies have been made since 2013 by different projects, initiatives or institutions, covering either Nexus-overall aspects, or specific conflicts between different sectors, and addressing different aspects such as knowledge generation, institutional development or management actions at different levels. The below table also includes information on which of these recommendations have been implemented in the meantime in the economy:

Main specific Nexus conflicts	Recommendations for Nexus synergies	Implementation
Hydropower development affects nature conservation areas	1. To improve/upgrade the existing power plants (capacity, multi-purpose, generation efficiency) and invest in energy efficiency as the first steps that contribute to sustainability[xxxviii] 2. To designate hydropower "no go" areas, e.g. for nature conservation priority zones[xxxix] 3. To increase the network of protected areas focusing in particular on the currently underrepresented natural and moderately modified rivers and streams, and on wetlands, as part of establishing representative networks of EU Natura 2000[xl] 4. To implement biodiversity mitigation measures[xli] at existing and planned dams 5. To establish ecologically meaningful environmental flows[xlii] 6. To increase the deployment of solar and wind generators (which however could result in need for pumped storage hydro plants)[xliii]	The total capacity of small power plants that produce energy from water potential is 120,399 MW, wind parks have an installed capacity of 50 MW, and photovoltaic power stations have an installed capacity of 16.713 MW. Energy efficiency is included in different ratified agreements (e.g. Protocol on Energy Efficiency and Related Environmental Aspects, Bosnia and Herzegovina), legislation and plans/strategieshowever, it remains unclear if it is considered as a 'first step'. Regarding environmental flows, an analysis by WWF demonstrated that a small hydropower plant in the Crnojevića River (Montenegro) operating on an e-flow regime would produce 2.4% electricity per annum less than if operating on a biological minimum[xliv]. Based on represented multidisciplinary researches' results, the team of experts developed the general procedure and methodology for ecologically-acceptable flow assessment in Montenegro which was later transformed into a by-law proposal (2016). The Ramsar Secretariat congratulated the Government of Montenegro for adopting this new forward-looking rulebook, which directly contributes to implementing the goal of the Resolution 12 on ´protecting the water requirements of wetlands for the present and the future´ adopted by the 12th Ramsar Conference[xlv]
Water (over)allocation to the different uses, in particular during drought events	7. To draft and implement (transboundary) River Basin Management Plans (Drin, Albania, The Former Yugoslav Republic of Macedonia, Montenegro, Kosovo*)[xlvi] 8. To draft and implement (transboundary) Drought Management Plans or (as preliminary step) to use hands-on operational (IT) tools for decision-making, coordination and communication before and during drought events 9. To create future projections of water demands depending on socio-economic analysis for the Bilecko Lake and its aquifer (Bosnia and Herzegovina, Montenegro)[xlvii] 10. To increase water management flexibility by multipurpose operations of dams[xlviii]	Declaration on the management of the extended Drin River Basin, 18th April 2011 Memorandum of Understanding for the Management of the Extended Transboundary Drin Basin (Drin MoU), between Montenegro, Greece, Albania, The Former Yugoslav Republic of Macedonia and Kosovo* (24th November 2011) Pursuant to the Agreement, the Commission has been established, with the aim of jointly understanding and resolving all problems related to the management of international river basins[xlix] To support their cooperation, projects funded by the Global Environmental Facility are being implemented by the Global Water Partnership and Global Water Partnership - Mediterranean in partnership with UNECE. In total the funding for 2016-2019 is US$ 5.5 million. The projects aim to

Main specific Nexus conflicts	Recommendations for Nexus synergies	Implementation
		improve the joint analysis and understanding of transboundary issues and have set up pilot projects to demonstrate sustainable development along the river and lakesand contribute to the development and implementation of a Strategic Action Plan decided on by the Riparians[l]. Drought Management Centre for South East Europe – DMCSEE has been established in Ljubljana[li]. DMCSEE focuses its work on monitoring and assessing drought and assessing risks and vulnerability connected to drought. The Regional Strategy on Drought Management in the Danube Region is one of the outputs of the ongoing project DriDanube (Drought Risk in the Danube Region) lead by ARSO from Slovenia[lii].
Dam operations causing hydro-peaking and subsequent ecosystem deterioration	11. To setup flagship projects (such as reintroduction of sturgeons in the river basin or return of the eel and marble trout to the upper White and Black Drin catchments)[liii] 12. See above (bullet 4)	
Land-use intensification and disappearance of certain habitats/ecosystems	13. See above and below (bullets 17 and 28)	
Increased energy consumption	14. Install energy-efficient wastewater treatment plants[liv] and water supply systems	There are 31 projects in progress in The Former Yugoslav Republic of Macedonia on construction of water and sewage networks
Cross-sector governance, transparency and accountability	15. To improve available datasets and their accessibility[lv] 16. To systematically employ Strategic Environmental Assessment (SEA) and Environmental Impact Assessments (EIA) to preliminarily assess effects of infrastructure developments (incl. hydropower), including scenario development and SWOT assessments for awareness-raising[lvi] and the informed involvement of stakeholders and the local communities 17. To examine the experience with SEA with the aim of expanding the use of nexus analysis within it[lvii]. 18. To reconsider the mandates of ministries and intersectoral bodies[lviii]	

Main specific Nexus conflicts	Recommendations for Nexus synergies	Implementation
	19. To analyze and coordinate/integrate the different timeframes and geographic scales for planning in different sectors[lix]. 20. To improve access to environmental justices (Aarhus convention) 21. To link spatial planning with river basin management and integrate adaptation to climate change[lx] 22. To implement more effectively (e.g. protection measures for ecosystems and biodiversity[lxi]) 23. To aggregate the outcomes of public participation at specific decision-making levels in order to take these into account at more strategic levels[lxii] 24. To develop broad, open, transparent and efficient platforms for reliable, high-quality data to serve as the foundation for high-quality decision-making[lxiii]	

Table 18 Nexus-relevant challenges and corresponding transboundary actions in river basins and aquifers

5. Annexes

5.1. References

5.1.1. Acronyms

The following acronyms have been used in the development of this Study:

Table 2: Acronyms

Acronym	
AL	Albania
BHD	Birds and Habitats Directives
BiH	Bosnia and Herzegovina
CAP	Common Agricultural Policy
CCS	Carbon Capture and Storage
DG	Directorate General
EC	European Commission
EEA	European Environmental Agency
EU	European Union
EU ETS	European Emission Trading System
EUR	Euro (currency)
FAO	Food and Agriculture Organization
FD	Floods Directive
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GWP-Med	Global water Partnership - Mediterranean
HR	Croatia
IWLEARN	International Waters: Learning Exchange and Resources Network
IWRM	Integrated Water Resource Management
kWh	Kilo watt hours
m3	Cubic meter
ME	Montenegro
MS	Member State
OECD	Organisation for Economic Co-operation and Development
RCC	Regional Cooperation Council
REC	Regional Environmental Center for Central and Eastern Europe
RIWMFA	Regional Integral Water Management Framework Agreement
RS	Serbia
SDG	Sustainable Development Goal
SEE	South East Europe
SEE2020	Regional growth strategy „SEE 2020 – Jobs and Prosperity in European Perspective“, endorsed in Sarajevo (November 2013)
SOER	State of the Environment

ToC	Table of Contents
ToR	Terms of Reference
TWRM	Transboundary water resources management
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nation Framework Convention on Climate Change
WEFE	Water-Energy-Food-Ecosystems (Nexus)
WGE	Working Group on Environment
XK	Kosovo
yr	Year

5.1.2. Glossary

The following terms have been widely used in the document, and are explained to ensure a common understanding.

Table 3: Glossary of key terms

Term	Explanation
Nexus	The interaction between policies and management of the different Nexus elements
Nexus approach	The Nexus approach has been introduced in the natural resources management agenda to facilitate the enhancement of water, energy and food security, while preserving ecosystems and their functions, and increasing climate resilience, by reducing tradeoffs, shifting towards more sustainable consumption patterns and improving demand management, building synergies and improving governance across sectors
Nexus fields/sectors of focus	Fields or sectors of the Nexus are in this case Water, Energy, Food and Ecosystems. Other institutions or projects work with different combinations of the Nexus fields or sectors
Conflict	the general pattern of groups dealing with disparate ideas[3]
Trade-off	A trade-off is a situation that involves losing one quality, aspect or amount of a Nexus element (e.g. water) in return for gaining another quality, aspect or amount of another Nexus element (e.g. energy).[4]
Climate resilience	the capacity for a socio-ecological system to: (1) absorb stresses and maintain function in the face of external stresses imposed upon it by climate change and (2) adapt, reorganize, and evolve into more desirable configurations that improve the sustainability of the system, leaving it better prepared for future climate change impacts[5]
Sustainable consumption patterns	Sustainable consumption relies on certain premises such as (1) Wise use of resources, and minimisation of waste and pollution; (2) Use of renewable resources within their capacity for renewal; (3) Fuller product life-cycles; and (4) Intergenerational and intragenerational equity[6]
Demand management	In natural resources management, demand management refers to policies to control consumer demand for environmentally sensitive or harmful goods such as water and energy[7]

[3] Wikipedia
[4] Adapted from Wikipedia
[5] Wikipedia
[6] Wikipedia
[7] Wikipedia

Synergies	The creation of a whole that is greater than the simple sum of its parts[8]
Governance	The processes of interaction and decision-making among the actors involved in a collective problem that lead to the creation, reinforcement, or reproduction of social norms and institutions[9]
Natural resource management	The management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations (stewardship)[10]
Strategic document	These include policy papers, strategies, action or investment plans, communications, key projects or similar initiatives

5.1.3. Regional information sources

- Energy Potential of Montenegro 2015,Chamber of Economy of Montenegro;
- Energy Development Strategy of Montenegro by 2030; 2015
- An Energy Policy for Europe,2007;
- www.epcg.com;
- https://www.theglobaleconomy.com/Montenegro/Energy_imports/;
- Strategy for the development of agriculture and rural areas 2015-2020, 2015;
- MONSTAT,2017
- https://www.monstat.org/eng/page.php?id=62&pageid=62;
- https://www.monstat.org/eng/page.php?id=62&pageid=63
- https://www.monstat.org/eng/page.php?id=62&pageid=65
- https://www.monstat.org/eng/page.php?id=62&pageid=66
- https://www.indexmundi.com/facts/montenegro/indicator/SP.URB.TOTL.IN.ZS
- https://www.theglobaleconomy.com/Montenegro/forest_area/
- https://www.theglobaleconomy.com/Montenegro/Percent_agricultural_land/
- The Fifth National Report to the United Nations Convention on Biological Diversity, 2014;
- Introductory report on nature conversation in Montenegro, 2010;
- http://www.prirodainfo.me/Mapa
- https://www.indexmundi.com/montenegro/habitat-protection.html;
- https://www.indexmundi.com/montenegro/habitat-protection.html;
- http://cmsdocs.s3.amazonaws.com/summarystats/2017-3_Summary_Stats_Page_Documents/2017_3_RL_Stats_Table_5.pdf;
- https://knoema.com/atlas/Montenegro/topics/Environment/Biodiversity-and-Protected-Areas/Threatened-mammal-species;
- https://knoema.com/atlas/Montenegro/topics/Environment/Biodiversity-and-Protected-Areas/Threatened-mammal-species;
- https://www.theguardian.com/news/datablog/2013/nov/26/iucn-red-list-threatened-species-by-country-statistics#data;

[8] Wikipedia
[9] Wikipedia quoting Hufty, Marc (2011).
[10] Wikipedia

- https://knoema.com/atlas/Montenegro/topics/Environment/Biodiversity-and-Protected-Areas/Threatened-fish-species;
- Biodiversity Strategy with the Action Plan for the period 2010-2015; 2010;
- The Initial Communication on Climate Change of Montenegro to the UNFCCC, 2010
- https://unfccc.int/resource/docs/natc/mnenc1.pdf;
- The Economic Impacts of climate change in Montenegro, 2010
- http://www.un.org.me/Library/Environment-and-Green-Economy/5a%20The%20Economic%20Impacts%20of%20Climate%20Change%20in%20Montenegro.pdf;
- The Second Communication of Montenegro to UNFCCC, 2015;
- http://www.privrednakomora.me/sites/pkcg.org/files/multimedia/main_pages/files/2012/09/116_dug_drzave.pdf;
- http://www.privrednakomora.me/razmjena-sa-inostranstvom;
- https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=ME;

5.1.4. Institutions contacted

The following institutions have been contacted in the development of the study:

Table 4: Institutions contacted

Institution contacted	Details
Water Management (ME)	Natasa Rakocevic, Milo Radovic
COTEE (Crnogorski Operator Trzista Elektricne Energije) (ME)	Jovan Pavicevic
Directorate for Environmental Protection, Ministry of Sustainable Development and Tourism (ME)	Vasilije Buskovic

[i] Sources: latest available data from the economies' statistical sources, complemented with FAO Aquastat, Worldbank, IEA and UNEP-WCMC. Further details are available in the specific chapters of the Study.
[ii] Source: Nexus assessment Excel Sheet
[iii] Source: Nexus assessment Excel Sheet
[iv] Sources: Monstat,Department for labour market, living conditions, social services and household consumption
[v] Source: Nexus assessment Excel Sheet
[vi] Source: Nexus assessment Excel Sheet
[vii] Source: Nexus assessment Excel Sheet
[viii] Source: Nexus assessment Excel Sheet
[ix] Source : First Communication of Montenegro to UNFCCC)
[x] Source: Institute of Hydrometeorology and Seismology
[xi] https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-2; 'stressed' beyond 20% and 'severely stressed' beyond 40%: The water exploitation index has been calculated as a multi-annual average per river basin district, for the years 2002-2012, as defined in ECRINS. The ECRINS

delineation of river basin districts differs from those defined by Member States under the Water Framework Directive, particularly for trans-boundary river basin districts. The regionalised Water Exploitation Index (WEI+) is calculated as the ratio of water use over renewable water resources (see Indicator Methodology chapter for further clarification). Raskin et al. (1997) suggests a WEI value above 20 % indicates water scarcity whereas a value higher than 40% indicates severe water scarcity.

[xii] Sources: Statistical data, FAO/Aquastat

[xiii] Indicating the water consumption proportion of the available water resources. The WEI+ has been calculated as the quarterly average per river basin district. Source: EEA, http://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-exploitation-index-for-river-1.

[xiv] https://washdata.org/

[xv] WHO/UNICEF, 2017, page 21

[xvi] UNECE, 2017a, page 53

[xvii] Source: SEE Nexus Regional Study

[xviii] Source: SEE Nexus Regional Study

[xix] Source: SEE Nexus Regional Study

[xx] Source: SEE Nexus Regional Study

[xxi] Source: IEA; www.iea.org

[xxii] Source: IEA, www.iea.org

[xxiii] Sources:MONSTAT

[xxiv] Source: SEE Nexus Regional Study

[xxv] Source MONSTAT

[xxvi] EEA, 2010, page 124

[xxvii] Source: SEE Nexus Regional Study

[xxviii] https://ec.europa.eu/agriculture/enlargement/

[xxix] EEA, 2010, page 87

[xxx] http://www.fao.org/faostat/en/#data/FS

[xxxi] EEA, 2010, page 123

[xxxii] Sources: 2018 data taken from UNEP-WCMC, 2018. Montenegro data from https://www.indexmundi.com/montenegro/habitat-protection.html except 2020 data from Economy's Strategy.

[xxxiii] https://www.cbd.int/countries/profile/default.shtml?country=me. The content of this biodiversity profile is still draft. The text below has been prepared by SCBD and remains subject to final approval by the Party concerned.

[xxxiv] Source:MONSTAT

[xxxv] Source: Nexus Assessment

[xxxvi] For some of the documents, a screening assessment whether the considerations are of 'high' or 'low' relevance has been carried out; for others a 'yes' or 'no' is stated

[37] http://www.savacommission.org/event_detail/0/0/303/3). Source: 2nd Sava River Basin Analysis,2016

[xxxviii] Euronatur and ECA Watch (Schwarz, 2012) reports; and UNECE, 2017a, page 54

[xxxix] Recommendations of the 2010 EU Water Directors Statement (Kampa, et al. 2011)

[xl] Harmel et al, 2017, p.144 referring to the Drin river

[xli] For example taken from the IEA guidelines for decision-making first published in 2000 and updated in 2010 or the European funded SHERPA project or the South-East-Europe Cooperation Programme, co-funded by the European Regional Development Fund has issued a series of recommendations and handbooks on sustainable management of hydropower as part of the SEE HydroPower Project.

[xlii] UNECE, 2017a, page 67

[xliii] UNECE, 2017a, page 54

[xliv] UNECE, 2017a, page 67. Note it is not clear if the regime has been implemented in practice.

[xlv] http://www.greenhome.co.me/index.php?IDSP=849&jezik=eng

[xlvi] Harmel et al, 2017, p.134 referring to the Drin river. UNECE, 2011, p.277 refers to such an approach as "The Petersberg Phase II/Athens Declaration Process (coordinated by Germany, Greece and the World Bank, supported technically and administratively by GWPMed), acting in cooperation with UNECE, GEF and UNDP, facilitates a regional multi-stakeholder dialogue process, aiming to explore possibilities of moving the level of cooperation from the sub-basin to the Drin Basin level."

[xlvii] DIKTAS, 2014, p22
[xlviii] UNECE, 2017a, page 73
[xlix] WFD-eu.me
[l] http://drincorda.iwlearn.org/gef-supported-drin-project
[li] www.dmcsee.org
[lii] http://www.interreg-danube.eu/approved-projects/dridanube
[liii] Harmel et al, 2017, p.144 referring to the Drin river
[liv] UNECE, 2017a, page 63
[lv] E.g. UNECE, 2011, p.272: „Numerous measures are needed with regard to Beli Drim/Drini Bardhe aquifer (No. 133); priority should be given to monitoring groundwater quantity and quality, detailed hydrogeological and vulnerability mapping, delineation of protection zones, construction of wastewater treatment facilities as well as to public."
awareness campaigns.
[lvi] E.g. UNECE, 2011, p.272 re Beli Drim/Drini Bardhe aquifer
[lvii] UNECE, 2017a, page 77
[lviii] UNECE, 2017a, page 77
[lix] UNECE, 2017a, page 77
[lx] Harmel et al, 2017, p.134
[lxi] Harmel et al, 2017, p.134
[lxii] UNECE, 2017a, page 26
[lxiii] UNECE, 2017a, page 26