Nexus Mapping Study for South-East Europe: Report for the Republic of Serbia

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**
SERBIA		Initial draft by Jelena Batica	Guido Schmidt
Mbl	04/05/2018	Review – language check by Maria Berglund	Guido Schmidt
0b	04/05/2018	Review – content comments by Guido Schmidt	Jelena Batica
0b-JB_1	11/05/2018	Finalising draft report including comments by Jelena Batica	Guido Schmidt
1	14/05/2018	QA-ed draft version	GWP-Med
1a	14/05/2018	Figure 12 updated	GWP-Med
1a-0181214	14/12/2018	Revised final report by Jelena Batica	Guido Schmidt
1b	14/12/2018	QA Final Report	Jelena Batica
1b-jb	19/12/2018	Additions	Guido Schmidt
1c	19/12/2018	Final review	GWP-Med

1. Introduction

1.1. Purpose of the study – Context

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 trans-boundary 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 trans-boundary 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 trans-boundary basins in the SEE2020 region.

The study focuses SEE2020 Region, including Albania, Bosnia and Herzegovina, The Former Yugoslav Republic of Macedonia, Kosovo*[i], 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:

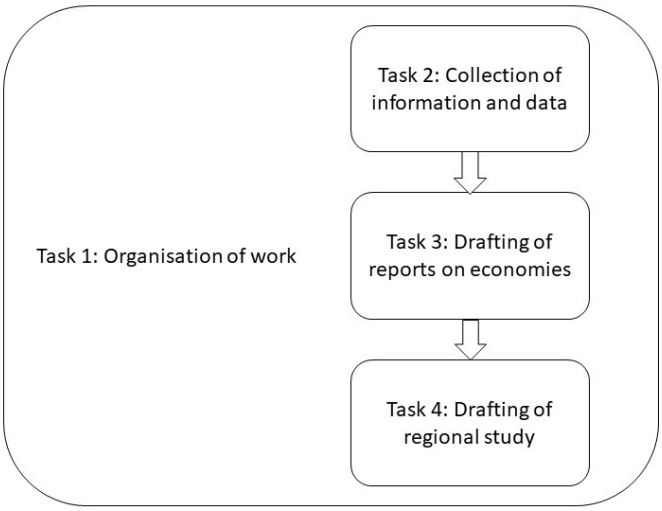


Figure 1: Schema of work developed for the study.

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.

2. Nexus Assessment for Serbia

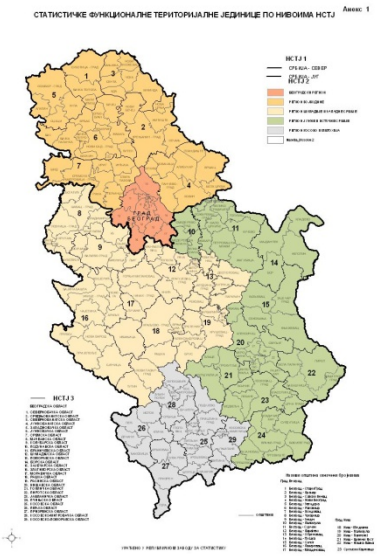
The nexus approach for economy analysis provides a better understanding of resource efficiency and the good governance of trans-boundary basins. This report focuses on the Serbia, specifically on water, macro economy indicators, energy, infrastructure, agriculture, biodiversity and climate change. Within these sectors, the main findings will be presented as well as their integration among the Nexus related sectors regarding the management of the Nexus resources.

2.1.1. Key data and trends

Sectors in Nexus were analysed with a focus on the data status, related trends and commitments relating the use of natural resources and exchange within the sectors with neighbouring countries.

Serbia comprises five regions (Belgrade region, Vojvodina region, Sumadija and western Serbia region, eastern and southern Serbia region and Kosovo-Metohija region). They include the City of Belgrade – the capital with a population of 1.65 million - as a separate territorial unit established by the Constitution and law, and 30 administrative areas, 24 cities, 30 urban municipalities, 150 municipalities, 6 158 villages and 193 urban settlements[ii].Serbiaalsohas two autonomous provinces, Vojvodina and Kosovo-Metohija.

Source: http://www.serbiamap.net/mapview.html?mapname=karta_srbije



Source: http://webrzs.stat.gov.rs/WebSite/userFiles/file/Opsti%20podaci%20u%20Republici%20Srbiji/dokumenti/razno/NSTJ.jpg

Figure 1: Physical and political map of Serbia

2.1.1.1. Economy

The key socio economic parameters for Serbia beside its economy size are nominal gross domestic product, economic sectors by share of GDP, population size and population trend. The presented parameters are in table below.

Data type	Unit	Data
Economy size of Serbia	km^2	88509
Nominal GDP for year 2017 (latest available)	Mio. EUR (current)	36795.37189
Key economic sectors by share of DGP (latest available)	% share	Industry (24%), Construction (5%), Agriculture/forestry/fishery (10%) and Services (61%)
Population size (latest available)	Mio. Persons	7 186 862
Population trend	% change since year 2003	-6.10%

Table 1: Key socioeconomic data for Serbia

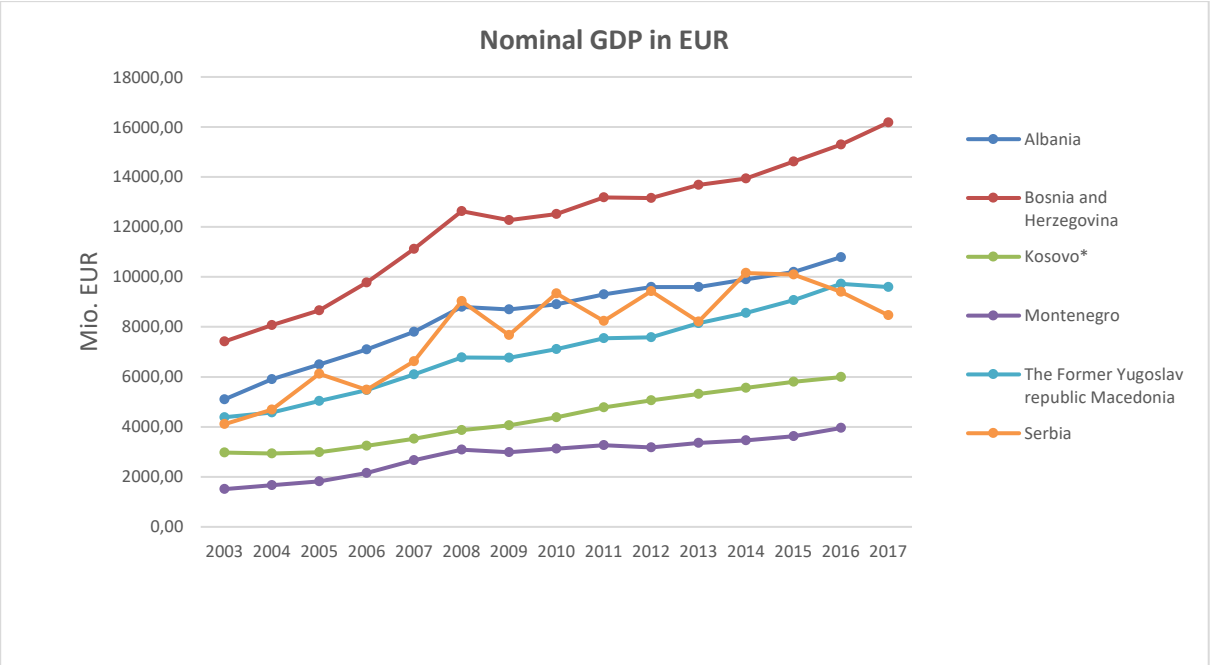


Figure 2: Evolution of nominal GDP in SEE economies (in Mio. EUR)[iii]

Agriculture as one of primary sector in economy in recent years has a decline trend. The value of share is in range of 11.4% in 2003 year to 6.5% in 2017 year. Compared to other former Yugoslav republics (Bosnia and Herzegovina, Montenegro and Macedonia) the share value of agriculture is in the range of Serbia.

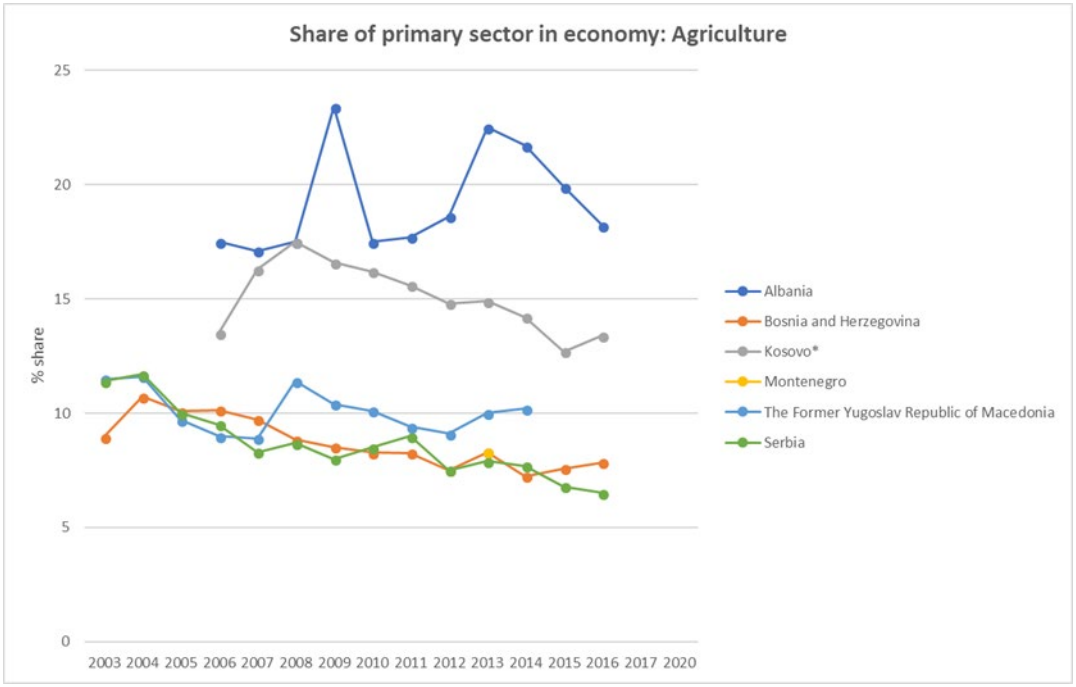


Figure 3: Share of primary sector in economy: Agriculture

The dominant share in GDP represents industry sector with the range of share between 23.5% to 27%.

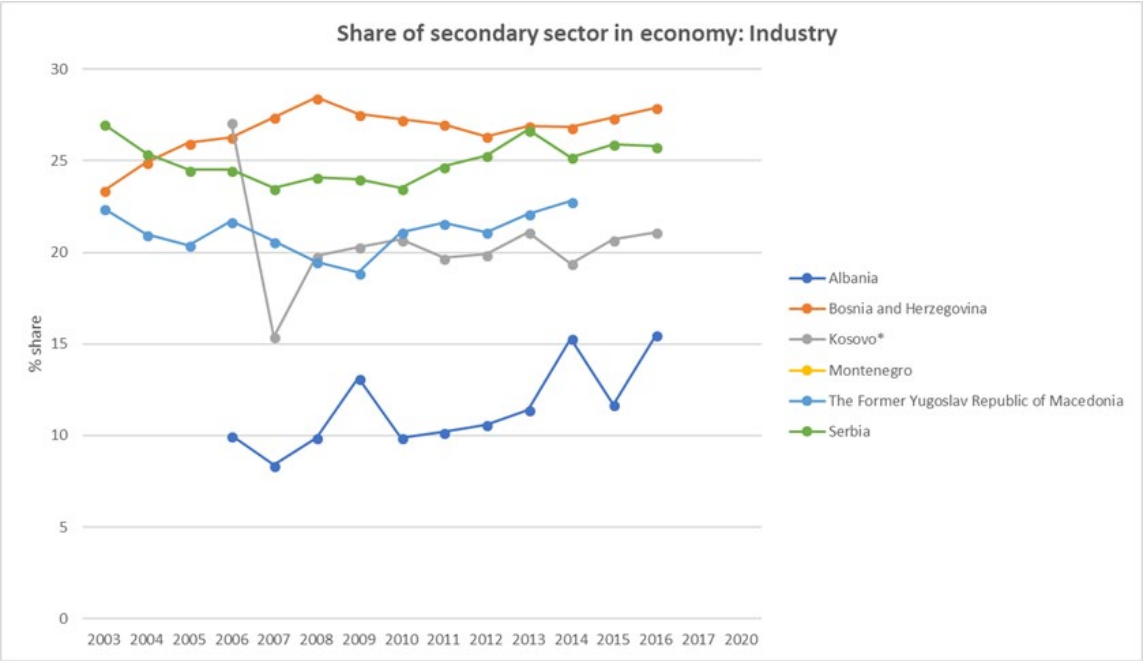


Figure 4: Share of secondary sector in economy: Industry

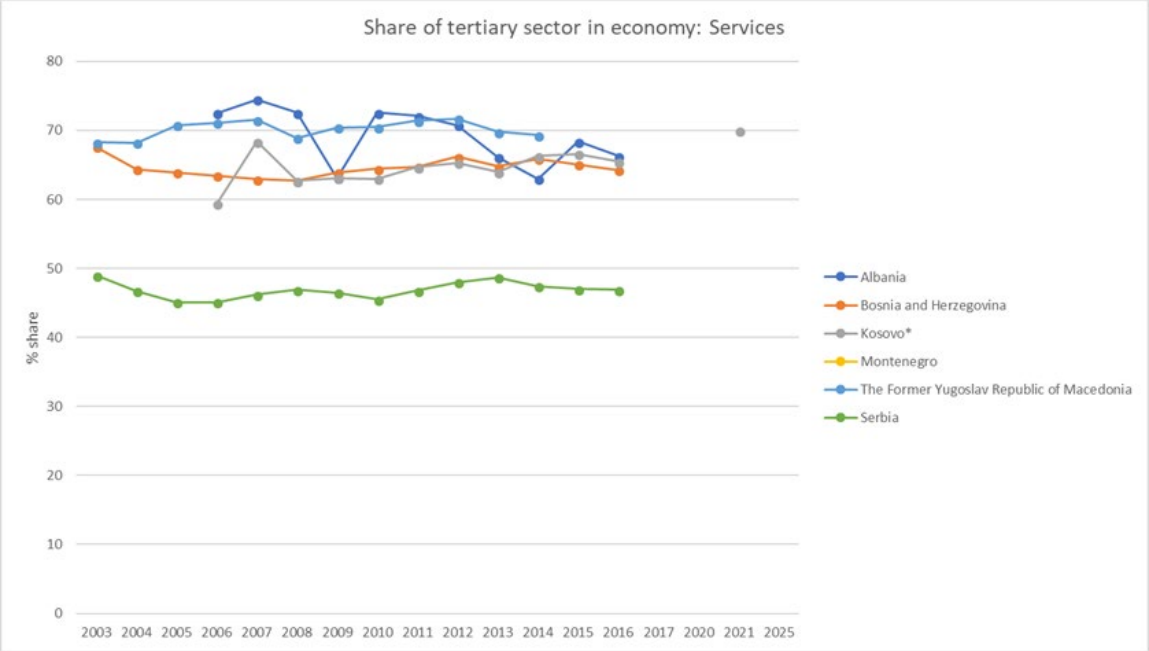


Figure 5: Share of tertiary sector in economy: Services

Sector services have the highest share in country GDP with the range from 45.2% to 49%. Poverty and unemployment in Serbia are on high level. Again, due to the crisis, and before crisis huge political change and wars during 90's Serbia faced significant challenges.

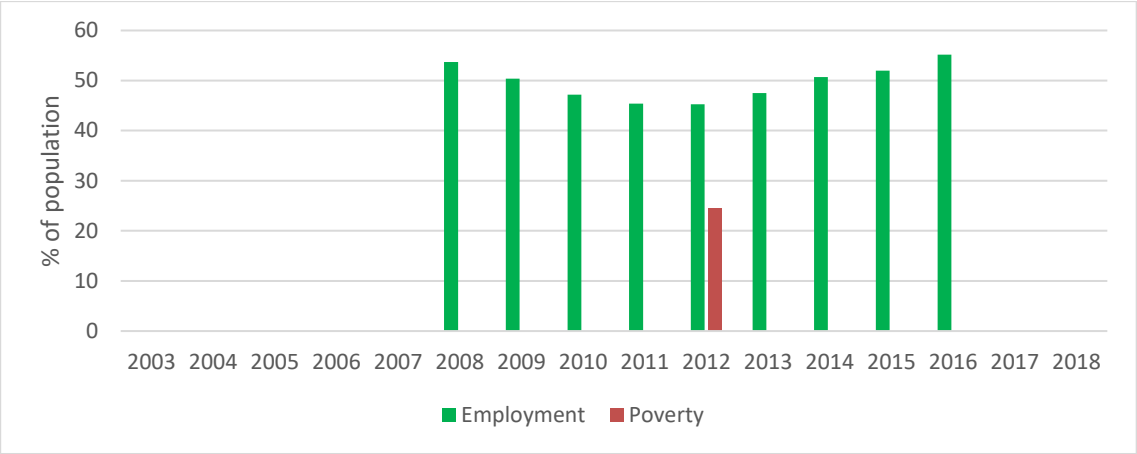


Figure 6: Evolution of key socio-economic indicators in Serbia (Source: Statistical Bulletin 2008-2016)

The unemployment rate few years ago was over 25% while due to the economic measures and activating programs for self-employment using the international funds and government policies in different sectors unemployment rate declined to 14%.

The Gini index represents the (in)equality of wealth distribution, and for Serbia comparing to other SEE economies is presented in the figure below.

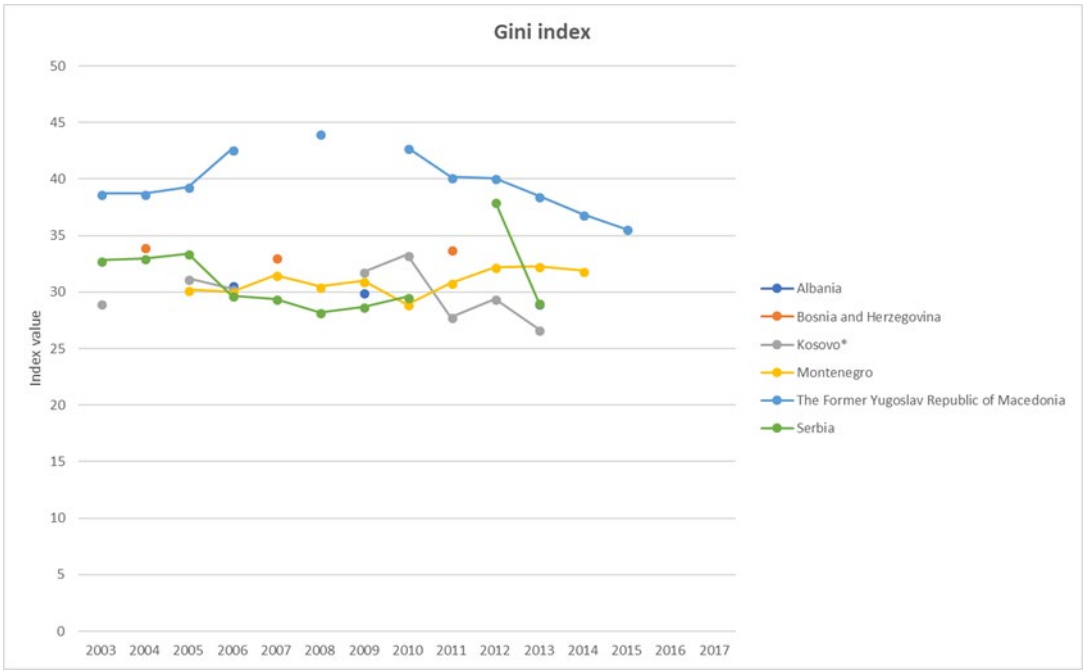


Figure 7: Gini Index

2.1.1.2. Water

The documents in Serbia related to water use and water management in general the Water Management Base of Serbia (2001), Water Management Strategy (2015) and Water Law. Institutionally, the water sector in Serbia is under purview of the Ministry of Agriculture Forestry and Water Management and its management authority the Water Directorate.

As a downstream country for most of the neighbouring countries, Serbia is very involved in international cooperation activities, especially since the main water bodies in the country are trans-boundary. The areas of water use, water protection and water quality protection are very important for Serbia within the context of international cooperation. In Serbia,

92% of the water in the Danube, Sava and Tisza rivers and other watercourses is available. Poor water quality is also an issue as a result of trans-boundary pollution of waters entering Serbia. Large international rivers, Danube, Tisza and Sava bring 90% of surface waters. The other reason is poor waste management. Waste management remains a major challenge. Serbia lacks infrastructure for treatment, disposal and storage of hazardous waste. Only six landfills from around 3500 waste dumpsites comply with the EU requirements. Over 140 landfills and dumpsites have been estimated posing high risks to the environment. The level of recycling or re-use of waste is very low with only about 4%. The increasing lack of water resources – due in part to overconsumption, insufficient protection and climate change impacts - limits economic development in south-eastern Europe.

To assess the water sector in Serbia, data was gathered from several sources. Data gathering focused on official publications, strategies and documents. The main sources of information used included:

- Statistical Office of the Serbia
- European Statistic Database (EUROSTAT)
- Water Management Base of Serbia (2001)
- Management Strategy (2015)
- Law on Water, ("OfficialGazette of Serbia", no. 30/2010 and 93 /2012);including the transposition of the EU WFD

The data obtained is partly inconsistent. For example, different sources show different figures; however, the figures do not differ significantly. The data collection and data aggregation were a challenge for water sector. Several sources were used with the main one being Statistical Office of Serbia and EUROSTAT.

Key analytical data regarding water demand in the time-series from 2008 to 2012 was provided by the Statistical Office of Serbia. Data related to monthly availability, use, demand and consumption was not available.

Table 2: Key data gathered for Nexus analysis for water sector

Data type	Unit	Data						
		2007	2008	2009	2010	2011	2012	2013
Water availability	10^6 m^3/yr	3958.00	4014.00	4126.00	3891.00	4233.00	3869.00	4150.00
Water demand total	10^6m^3/yr		492.12	485.43	470.44	457.13	455.04	
Water demand sector: agriculture	10^6m^3/yr							
Water demand sector: urban (domestic use and other consumers)	10^6m^3/yr		381.48	378.54	366.44	350.18	355.98	
Water demand total and by	10^6m^3/yr		74.18	68.75	62.63	64.22	67.17	

Data type	Unit	Data						
		2007	2008	2009	2010	2011	2012	2013
sector: industry								
Water demand sector: energy production	$10^6m^3/yr$	2.97	3.07	3.22	2.99	3.33	2.93	3.26
Water abstraction	$10^6m^3/yr$	3958.00	4014.00	4126.00	3891.00	4233.00	3869.00	4150.00
Water consumption total	$10^6m^3/yr$	170.55	175.56	187.65	232.26	155.90	170.69	196.57
Water consumption, sector: agriculture	$10^6m^3/yr$			30.58	25.13	34.18	52.99	
Water entering the country	$10^6m^3/yr$	149615.80	153816.00	169130.00	213085.28	117121.39	129437.63	177188.26
Water leaving the country	$10^6m^3/yr$	151651.90	156311.00	176050.00	234047.43	125907.04	140826.27	189845.18

The total water demand is steadily declining in Serbia. Also, in several sources (Water Management Strategy) the main problem are the big losses in the water distribution systems. In short, the water network needs reconstruction and optimisation.

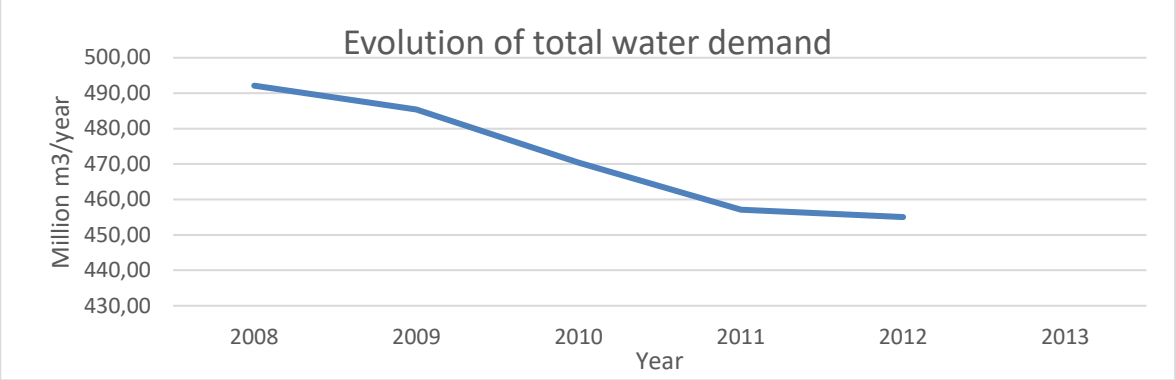


Figure 8: Evolution of water demand from 2008 to 2012 (Statistical Bulletin 2008-2012)

The reason for significant water demand presented in the graph above could be consequence of following: year 2008 is the beginning of the global crisis and this implies direct connection with production on a country level (industry and agriculture).

Situation regarding drinking water in Serbia shows increase in access to drinking water in rural areas. Drinking water and sanitation is generally safely managedwith some 91% recorded in 2015.

River system in Serbia was highly impacted with floods that occurred in 2014. Area affected with this hint over 75% of the country territory, also a major part of Bosnia and Herzegovina and Croatia was affected. The big concern was the safety of thermal plants and coal production[iv].

2.1.1.3. Energy

The Ministry of Mining and Energy governs the energy sector. This Ministry is responsible for the development of energy sector and its policy development. Two main pieces of legislation/strategy govern the energy sector: the Energy Law and the Energy Sector Development Strategy of Serbia for the Period up to 2020 with projections up to 2030. Production, distribution and electricity trade are carried out by the public company "Elektroprivreda Srbije".

The main objectives in energy sector are:

- Modernization and revitalization of existing hydroelectric power plants HE Đerdap I; HE Đerdap I; HE Zvornik; Vlasinske HE; Limske HE
- Promotion of Small hydro power plants (HE Sokolovica, HE Sveta Petka, HE Sićevo and others) - this objective has a big opposition from current Ministry of Environmental protection.
- Construction of new electro-energetic plants: TEKostolac, power 350 MW
- Rehabilitation and improvement of the power transmission network and investment in IT and telecommunication network, construction of new transformer stations and transmission lines.
- Technological Development Oil refinery and the achievement of EU motor fuel quality standards 2009+.
- Construction of the product pipeline system through Serbia:
    - Production of Pančevo - Smederevo, Product Line Pančevo - Novi Sad, Product Line Novi Sad - Sombor,Production of Smederevo - Jagodina -Ni and Pančevo - Belgrade
- Investing in the construction of the second phase of the BanatskiDvor gas underground warehouse, with gas line DV 04-18 Gospođinci-BanatskiDvor.
- The construction of an underground gas storage Itebej capacity billion m 3 of gas.
- Construction of gas pipeline from NištoDimitrovgrad
- Construction of co-generation plants and production of energy from renewable energy sources
- Increase a surface expansion from 9 to 12 million tons a year, for public company EPS branch TEKO Kostolac
- Opening of the surface of Radljevo, JP EPS RB Kolubara branch

Serbia has signed an agreement establishing the Energy Community for the South East Europe on 26th October 2005 in Athens (The Energy Community Treaty). The agreement was signed also by Montenegro, Croatia, Bosnia and Herzegovina, FYROM, Bulgaria, Romania, Albania and the Interim Administration of Kosovo*[v]. With this agreement, the commitments and plans regarding energy production and use follow EU regulations. This Agreement defines the electric energy and natural gas market. The obligation of implementation is assumed in accordance with Energy Community Tread and focuses on:

- Energy Security,
- Energy market, and
- Sustainably energy Sector: energy efficiency, RES, environmental protection.

To assess the energy sector in Serbia, the following key documents were used:

- The Energy Development Strategy of Serbia until 2025 with projections until 2030 ("Official Gazette of Serbia" No. 101/2015)
- Statistical Office of the Serbia
- Official Energy Balance documents
- Energy law (Official Gazette of the Serbia", No. 145/2014)
- World Bank - report - Support to water management in Drina basin (available pdf)
- Energy Agency of the Serbia - AERS

According to public company"ElektroprivredaSrbije", the capacity of the energy production system in Serbia is 22 thermo-blocks, 49 hydro-generators, 1 reversible hydroelectric power plant with 2 aggregates and 1 pump plant with 2 pumps. The maximum annual production of the power plants operated by EPS was 37,433 GWh of electricity in 2013.The key data related to energy sector are presented in the table below for the period from 2010 to 2016.

Table 3: Key data for energy sector (year 2010 - 2016)

Data type	**Data (GWh/yr)**						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Energy demand	175568.06	177116.11	164155.83	163924.43	142584.43	162908.05	167770.55
Install**led electricity production capacity -**	114881.11	122363.61	117548.33	133299.17	110900.28	94525.00	125503.89
Electricity production total	20976.66	100246.11	94559.72	100066.39	78057.22	94525.00	95267.22
Electricity production: coal	8405.55	91003.06	84645.83	89213.33	66440.28	83741.94	83746.94
Electricity production: hydropower	12571.11	9243.06	9913.89	10853.06	11616.94	10783.06	11520.28
Energy consumption total	84431.94	86519.16	81587.21	87560.26	81623.88	83971.67	88580.83
Energy consumption: households	28190.00	29598.06	29718.33	34079.44	32541.11	33671.11	34845.28
Energy consumption: industry	28925.28	31602.50	28564.17	28450.55	22908.61	24801.11	26505.00
Energy consumption: agriculture	1390.83	1364.17	2120.28	2114.44	2084.72	1812.50	2264.17
Energy consumption: transport	25925.83	23954.44	21184.44	22915.83	24089.44	23686.94	24966.39
Crude oil and refined petroleum production	10803.33	12926.39	14237.78	14649.17	14053.33	12948.06	11845.28

Natural gas production	3983.88	5228.61	5489.44	5465.55	5733.06	5890.83	5383.61
Electricity exports total	10775	11369.722	9900.555	14315.83	14118.06	17128.61	16639.72
Electricity imports total	73720.277	70084.722	59769.444	58059.16	58858.88	66672.78	71914.17

The drop in energy production for 2014 year is due the natural catastrophe occurred in May 2014[vi]. A flood event paralysed the energy system and created big losses. Being the transmission system operator (TSO), ElektromrežaSrbije, the Joint Stock Company (EMS JSC) is responsible for the allocation of rights to use available trans-boundary transmission capacities on interconnection lines of the Serbian power system. The mechanism for the allocation of rights to use available trans-boundary transmission capacities is defined by the Transmission Network Code, the agreements between the transmission system operator of Serbia (EMS JSC) and the transmission system operators of Hungary, Romania, Bulgaria, Bosnia and Herzegovina and Croatia. To this end, there are procedures and methods to allocate trans-boundary capacities and access to trans-boundary transmission capacities and general rules for available trans-boundary transfer capacities. The rules and agreements which were applicable in 2016, were approved by the Agency Council in the end of 2015[vii].

Table 4: Cross-border and internal transactions in the market area of Serbia 2009-2016 (Source: The Energy Development Strategy of Serbia until 2025 with projections until 2030)

Year	Cross border transactions entry	Cross border transactions exit	Internal transactions
2009	6883	8681	3679
2010	10551	11581	5853
2011	11171	11481	10004
2012	10781	10769	7815
2013	10094	13939	11711
2014	16637	14416	11574
2015	16165	16910	9835
2016	15526	17844	15633

Data analysis shows a more or less stable yearly energy demand.

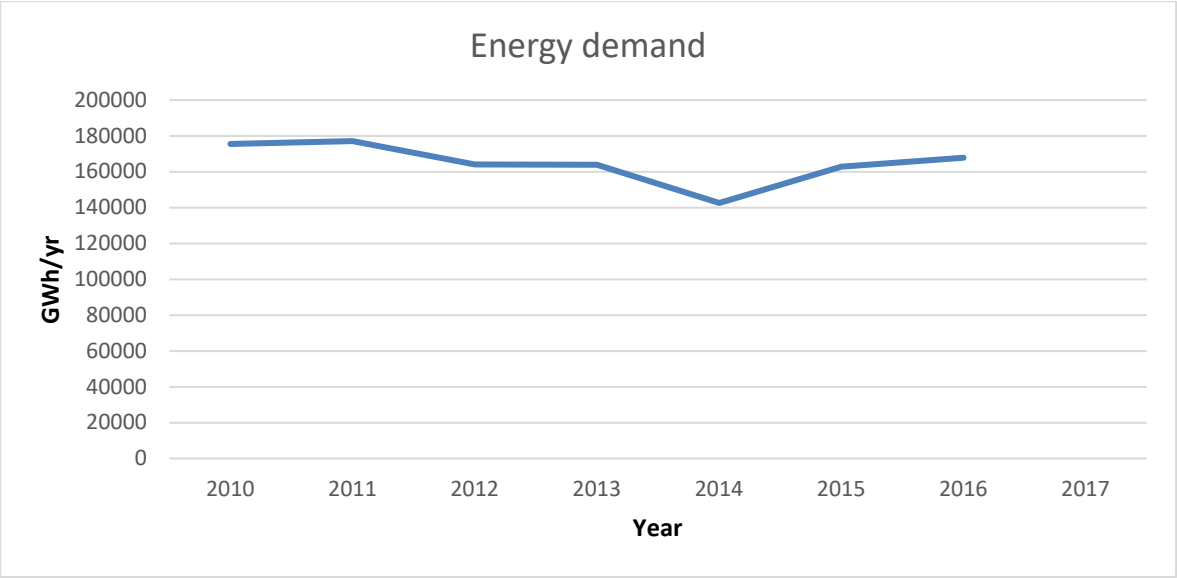


Figure 9: Energy demand for Serbia for period from 2010 to 2016 (Source: Statistical Bulletin 2010-2016)

As mentioned in the text above, the energy trends: demand, consumption, production and imports on a country level reflects the overall situation in country economy. The figure below reflects also declined trend in 2014 year due to natural disaster.

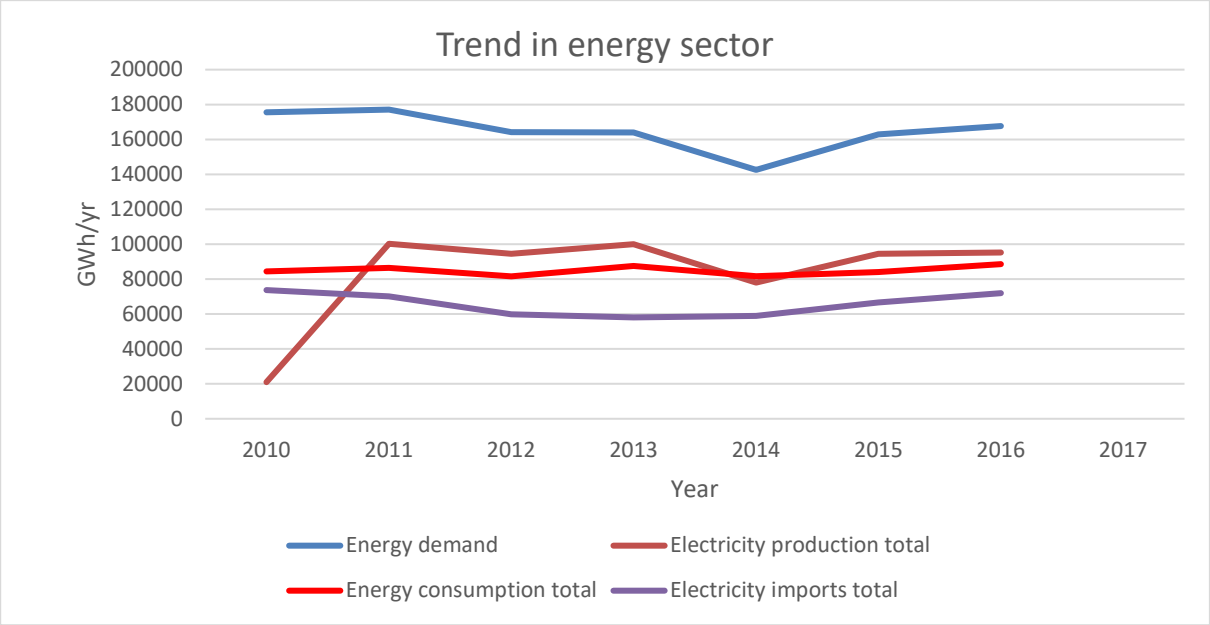


Figure 10: Trend data in energy sector of Serbiafrom 2010 to 2016 ((Source: Statistical Bulletin 2010-2017)

The majority of energy production comes from thermo plants (some 70%), whilst hydropower plants produce 30% of electricity.

The main strategic goals regarding heating in Serbia are to provide safe supply of households and industry. The current situation related to energy sources mainly used for heating is use of fossil fuels. The major source is natural gas with 48%, then liquid fuel 29% and coal 23%. The strategic projections are to reduce use of coal to 16.5%, liquid fuels to 14.3% and increase natural gas to 56.4% up to 2030[viii].

2.1.1.4. Agriculture and land use

Main trends in agriculture sector show that production is much higher than consumption. However, since the data found for import and export amounts are not expressed in tons but in Euros a proper comparison should not be established. The Agricultural sector in Serbia is under the institutional and legal management of the Ministry of Agriculture and Water Management. Serbia has very favourable natural conditions (land and climate) enabling diverse agricultural production (both plant and livestock). Current land use share is dominantly agricultural 57%, forests 38%, water bodies 1% and urban areas 4%.

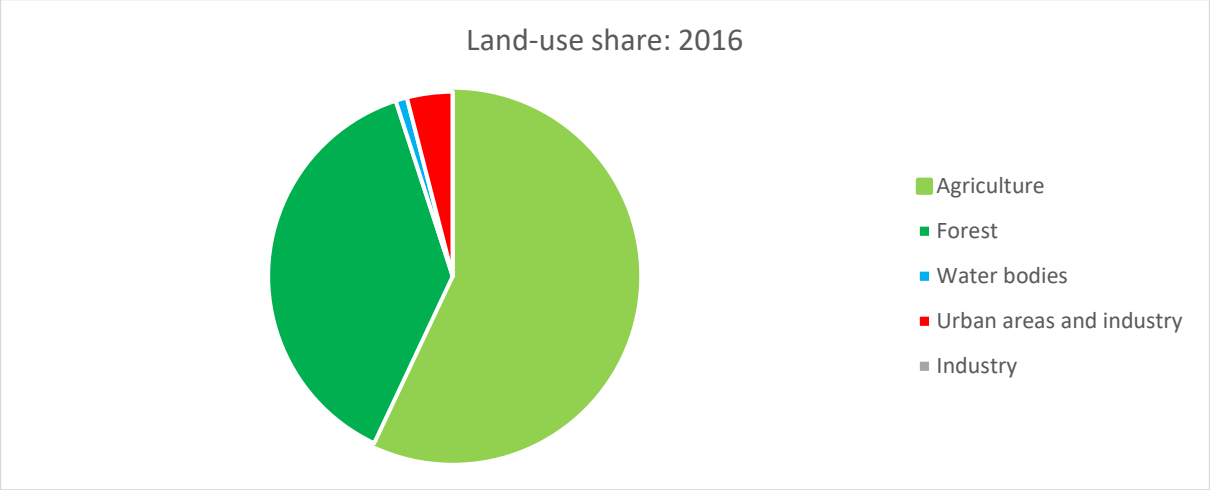


Figure 11: Land use share for Serbia (Source: Water Management Strategy 2015)

The main data sources analysed for the assessment of the agriculture sector and land use are:

- Statistical Office of Serbia,
- Strategy on agriculture development and
- Program for the agriculture development,
- Strategy on Forestry,
- Strategy on biodiversity and
- Strategy on sustainable use of resources

Data on import and export of agricultural goods are available but only expressed in total Euros.

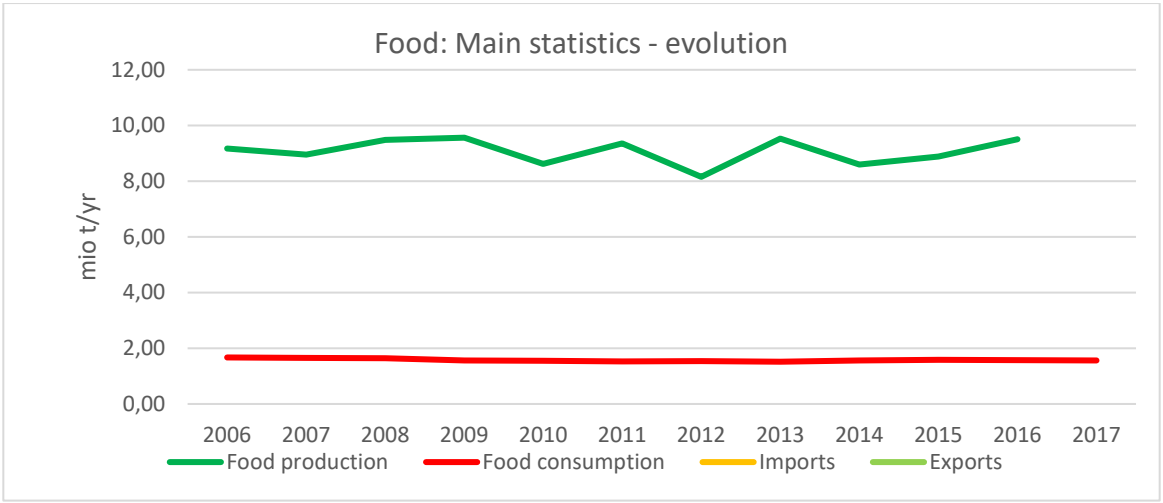


Figure 12: Main trend in food production and food consumption (Source: Statistical Bulletin 2006-2017)

The main objectives in the agriculture sector are:

- Improve natural resource management;
- modernise existing equipment;
- strengthen the food chain and authorities and logistical support organizations for the sector agriculture;
- establish a more efficient and operational systems for the implementation of existing and creation new knowledge and its transfer;
- improve the quality of life in rural areas by diversifying the rural economy and strengthening the social structure; and
- modernisation organizations and adaptation of agricultural policy to the Common Agriculture Politics model.

As one of fundamental components in SEE2020 agriculture, the irrigation areas are its systems due to increased modernisation trend put a pressure on water demand. The main application methods for irrigation that are used in agriculture in Serbia are sprinkler (37%) and drip (micro irrigation)(62%)[ix].

2.1.1.5. Biodiversity

The institutional framework for addressing biodiversity is set by the following documents:

- The Law on Nature Protection (Official Gazette of Serbia, no. 36/09, 88/10, 91/10);
- The Law on Amendments to the Law of Nature Protection was prepared (Official Gazette of Serbia, no. 14/16)
- The Decree on Ecological Network ("Official Gazette of Serbia", No 102/2010);
- The Rulebook on proclamation and protection strictly protected and protected wild species of plants, animals and fungi ("Official Gazette of Serbia", No 5/10 and 47/11);
- The Rulebook on habitat types, the criteria for the selection of habitat types, sensitive, endangered, rare and priority for protection habitat types ("Official Gazette of Serbia" no. 35/2010)
- The Rulebook on Compensatory measures ("Official Gazette of Serbia", No. 20/2010);
- The Rulebook on special technical-technological solutions which enable unobstructed and safe communication of wild animals ("Official Gazette of Serbia", No. 72/2010);
- The Law on Game and Hunting ("Official Gazette of Serbia", No 18/2010);
- Regulation on proclamation of protected game species by closed hunt season (OG of Serbia No 9/12, 97/13, 55/15, 67/15)
- The Law on Protection and Sustainable Use of Fish Stocks ("Official Gazette of Serbia", No 128/14);
- In addition, the following international conventions are adhered to by Serbia:
- Ramsar Convention - Convention on wetlands of international importance especially as aquatic birds habitats
- CITES Convention - Convention on international trade in endangered species of wild fauna and flora

- Bern Convention - Convention on the conservation of wild flora and fauna and natural habitats of Europe
- Bonn Convention - Convention on the conservation of migratory species of wild
- Adopted international principles and national targets for biodiversity conservation in Serbia were determined by adoption of the Strategy on biodiversity of Serbia for the period 2011-2018.

2.1.1.5.1. Trans-boundary protected areas

Special nature reserve, as protected area, is area of importance for wildlife, flora, fauna or some other geological interest reserved and managed for conservation and for provision of special opportunities for studies and research. For this study the areas of interest are one located at the border of the country. The two of them are areas of interest: Upper Danube (Serbia-Croatia-Hungary) and Labudovo Okno (Serbia-Romania).

Special nature reserve "Upper Danube" in 2007 with 22 480 ha, protected by the natural good of category I, which extends along the left bank of the Danube River, from 1367 to 1433 km of its course. It is part of a large ritual complex that extends across neighbouring Hungary and Croatia, and as a whole, it is one of the last major floodplains on the ground of the European continent[x].

"Labudovo okno" is located 75 km east of Belgrade. It is situated along the Danube from the ada of Žilava to the Serbian-Romanian border. Except for the small patch of the Danube's right bank, which is in Central Serbia, all of the reserve is located in the province of Vojvodina, in the municipalities of Kovin and Bela Crkva. It also marks the border between the regions of Banat on the north and Braničevo on the south.

There are ten natural areas in Serbia that are on the list of internationally important wetlands, the so called Ramsar sites, covering an area of 63,919 hectares. The Institute for Nature Conservation of Serbia has determined a preliminary list of 68 additional potential Ramsar sites in Serbia.

A limitation when collecting data to assess is that the biodiversity data in the country is most frequently adjusted to requirements of a particular commitment (the data are collected just for counting purposes for particular topic and there is no proper data management system established on a country level). A significant issue that the data was not readily available online, often only located in paper form, making it difficult to structure for data analysis (e.g. tabulation). Only a few stakeholders use database management system as a solution for the management of biodiversity data.

The main data sources for this report are:

- Institute for Nature Conservation of Serbia (http://www.zzps.rs)
- Agency for Environmental Protection (http://www.sepa.gov.rs/)
- IUCN Serbia and http://www.nationalredlist.org/

Table 5: List of natural areas in Serbia listed under Ramsar sites

No.	Ramsar area	Year of designation	Area (ha)
1	SNR "StariBegej - Stara bara"	1996	1767
2	SNR "Obedska bara"	1977	17501
3	NR "LudaskoJezero"	1977	593

4	SNR "SlanoKopovo"	2004	976
5	"Pestersko Polje"	2006	3455
6	"LabudovoOkno"	2006	3733
7	SNR "Upper Danube"	2007	22480
8	Landscape of Ex. Features "Vlasina"	2007	3209
9	SNR "Zasavica"	2008	1913
10	SNR "KoviljskoPetrovaradinskiRit"	2012	8292

There are a lot of pressures on biodiversity in Serbia. In the recent years the main causes of biodiversity decline are (i) fires in protected areas with high impact on forest ecosystems, (ii) agricultural production with exaggerated application of artificial fertilizers and uncontrolled drainage of liquid manure from cattle farms, (iii) construction of hydroelectric power plants, (iv) very intensive exploitation of sand and gravel from river bed which produces changes in morphology and hydrology characteristics of rivers and also causes destruction of flood zone vegetation, increase of flood risk, etc[xi].

2.1.1.6. Economy development

The macroeconomic features considered in this analysis are: gross domestic product (GDP), key economic sectors that are share GDP, Gini index (distribution of country income to inhabitants), employment rate and it projections, external depth, import and export. All these parameters form a very good description of Nexus sector.

As for most of SEE countries, the 2008 crisis had a strong influence on economy. The decline trend is visible in both import and export figures.

Also, during this period (2006 -2017) the public depth had a significant growth from some 30% of GDP up to 74% of GDP in 2015. This was very hard for Serbian economy. The restriction measures were applied. This process was guided by government and IMF. At this point, the public depth is declining with projected yearly growth of 4.5% (estimated for the first quartile of 2018.)[xii].

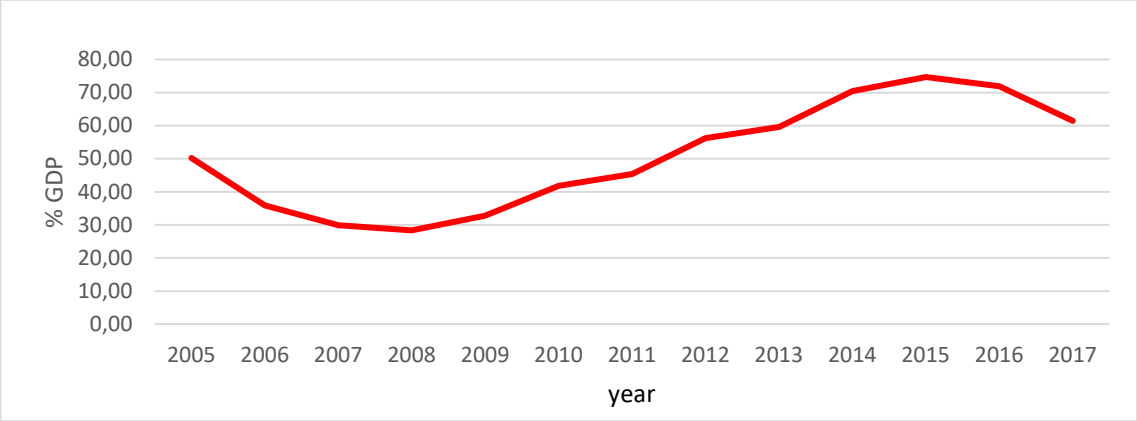


Figure 13: Public depth expressed through % of GDP (Source: Statistical Bulletin 2003-2017)

The economy sector in Serbia is managed by the Ministry of Economy. Serbia is a user of International Monetary Fund and under its supervision. Relevant data on macroeconomic indicators are provided by Bank of Serbia[xiii] and the Statistical office of Serbia.

Key trend figures that reflect the economy sector are provided in figure below.

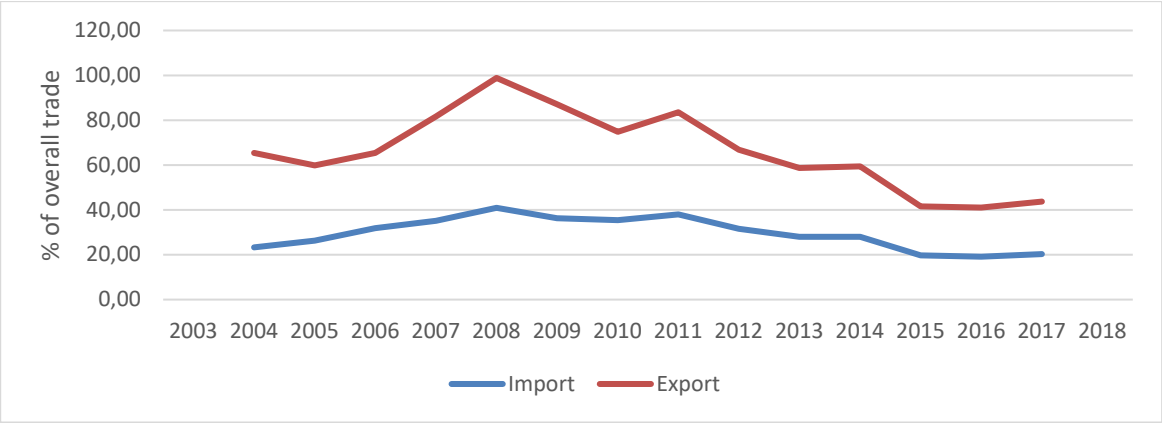


Figure 14: Economic relevance of exchange with SEE2020 economies: imports and exports (Source: Statistical Bulletin 2003-2017)

The main countries for import of goods from Serbia for 2017 are Germany and Italy with total import values of 3134.95 Mio. Euros and 2495.20 Mio. Euros respectively.

Regarding the SEE region Serbia has the highest imports from Romania, Bosnia and Herzegovina, Slovenia, Croatia and Bulgaria. Export to SEE region is focused on Bosnia and Herzegovina, Romania, Montenegro, Croatia, Bulgaria, Slovenia, FYROM and also Albania and Greece in lower amounts. This comment refers to last year statistics. The whole data with total amounts is presented in the Excel country sheet.

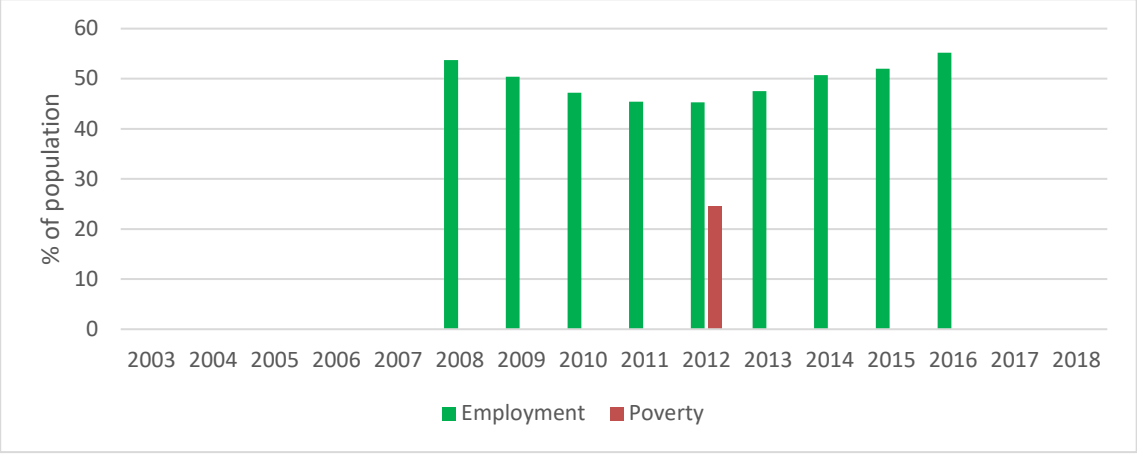


Figure 15: Evolution of key socio-economic indicators in Serbia (Source: Statistical Bulletin 2008-2016)

Poverty and unemployment in Serbia is on high level. Again, due to the crisis, and before crisis huge political change and wars during 90's Serbia faced significant challenges. The unemployment rate few years ago was over 25% while due to the economic measures and activating programs for self-employment using the international funds and government policies in different sectors unemployment rate declined to 14%.

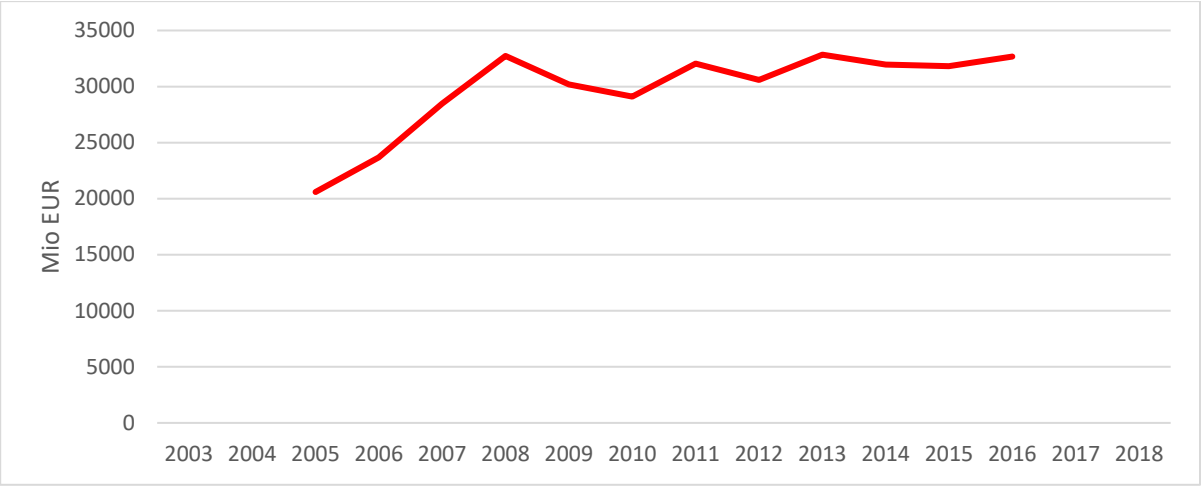


Figure 16: Evolution of nominal GDP (in EUR) in Serbia (Source: https://www.ceicdata.com/en/indicator/nominal-gdp)

Nominal GDP has rising trend with small oscillations when compared for two-year periods. Looking on a period of 10 or more years nominal GDP raised from 4106.7 MioEuro (2003) to 8463.4 Mio Euro (2017).

Highly visible and important to say regarding the share of different sectors in GDP is the fact that government every year from the current budget give subventions to different sectors. At the end of the year when calculating the total income per sector, from total, the amount given as subvention is subtracted. This results in a bit strange results. For example for year 2016, the shares in economy sectors were: primary sector 6.5%, secondary 25.8%, tertiary and other 46.9%. In total its 79.2% which differ from 100%. This means that the 20.8% was given from the budget as a subvention.

2.1.1.7. Infrastructure

This sector comprises several ministries in Serbia: Ministry of Trade, Tourism and Telecommunications, Ministry of Construction, Transport and Infrastructure and Ministry of Mining and Energy.

Regarding blue infrastructure, the waterways are under the jurisdiction of Ministry of Construction, Transport and Infrastructures and Ministry of Agriculture, Forestry and Water Management.

Data obtained to assess this sector came from the following sources:

- Statistical Office of Serbia
- World Bank
- Agency for Electronic Communications and Postal Services (RATEL)

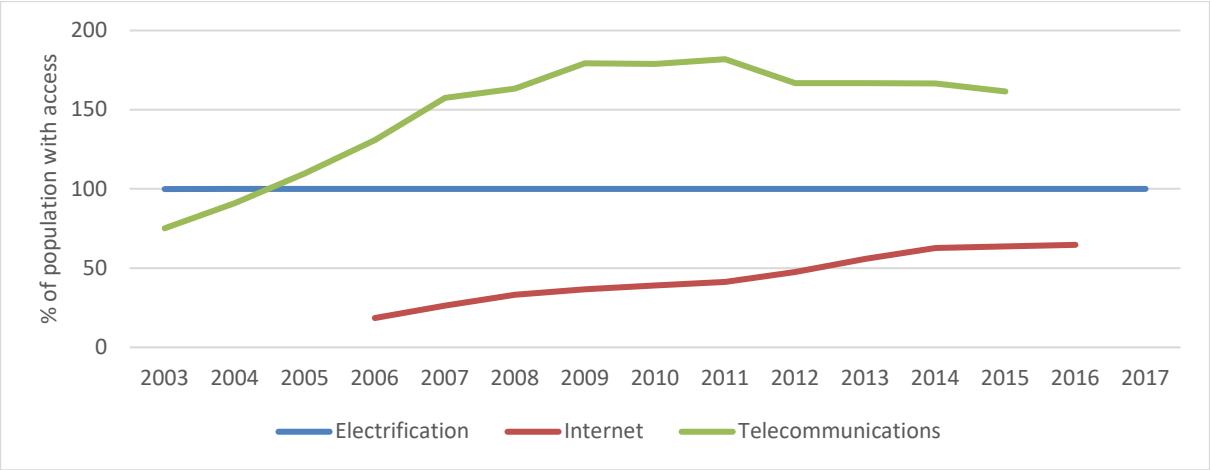


Figure 17: Evolution of infrastructure in Serbia (Source: Agency for Electronic Communications and Postal Services, Statistical Bulletin 2003 - 2017)

The available data for the infrastructure sector in Serbia shows that the electricity network has 100% coverage and internet coverage has had positive growth with years, starting from 18.5% in 2006 to 64.7% in 2016. Telecommunications had coverage up to 161% in 2016.

The data shows that the most frequent mean of transportation is public transport and then road transport (private cars), while the most frequently used transportation mode for freight are trains. Among collected data the transportation of good via inland waterways is present as low.

2.1.1.8. Climate Change

Climate change issues in Serbia are addressed by the Ministry of Environmental Protection and Ministry of Agriculture, Forestry and Water Management.

Key climate change impacts have been identified in the water sector (hydrological events, water quality, water use and ecology). The sectors highlighted as the most vulnerable to climate change are agriculture, hydrology, forestry, and human health.

Table 6: The most vulnerable sectors to climate change in Serbia[xiv]

Hydrology	**Even in the 20th century rivers are having negative trend regarding discharges. This reduction is expected in the future, especially after 2050 with range from few% to 20%. This will have reflection on water availability, water quality and increased frequency of floods and droughts.**
Forestry	In general droughts, insect's invasions and forest fires will have serious influence on forest ecosystems in R. Serbia. At a long term this will cause transformation of existing forest ecosystems in distribution and composition.
Agriculture	Spatial variation in agro climatic conditions will be changed, as well as plant breeding and selection of suitable varieties.
Health	Heat waves contributing to mortalities are expected. Also the increase in temperature will contribute to increase in frequency of vector borne infectious diseases (malaria, dengue fever, West Nile virus, etc.) and water born infective diseases.

The figure below shows the annual GHG emissions in the country.

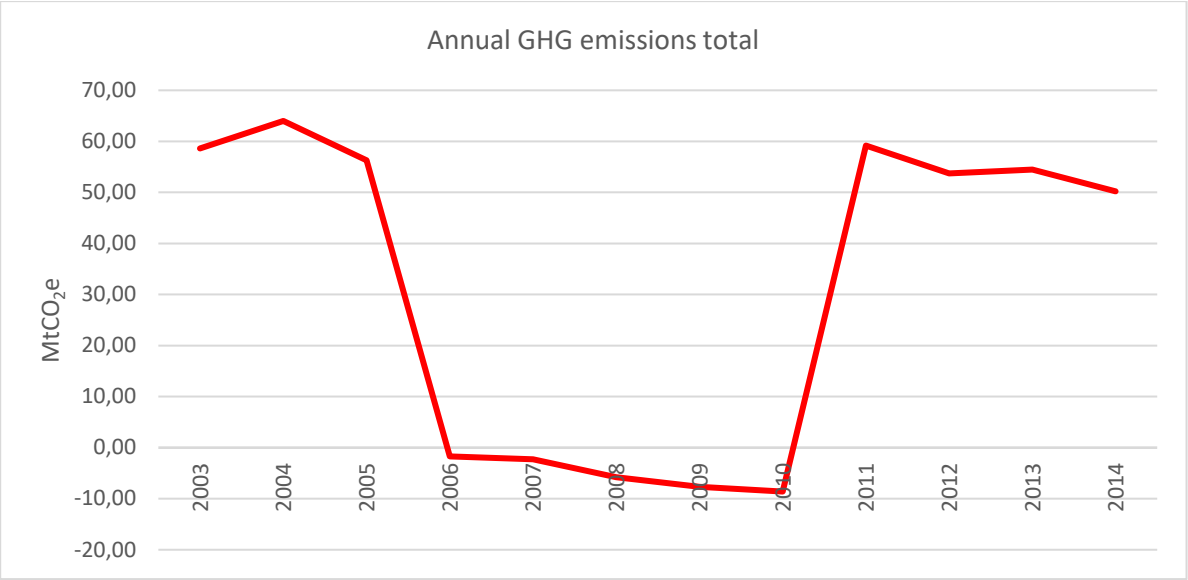


Figure 18: Total annual GHG emissions (Total annual GHG emissions in Serbia)[xv]

According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), Serbia's GHG profile in 2013 was dominated by emissions from energy, which accounted for 80.0% of the country's total emissions[xvi],excluding the land-use change and forestry (LUCF) sector[xvii]. Within the energy sector, electricity and heat generation were responsible for 70% of emissions. Agriculture was the second highest source of emissions (11.6%), with synthetic fertilizer and enteric fermentation from livestock contributing 62% of agriculture emissions. Waste and industrial processes (IP) contributed 5.1% and 3.3%, respectively.

The projections of GHG emissions on sectoral and total levels are made for three scenarios[xviii]: (i) basic, (ii) scenario with measures and (iii) scenario with additional measures. Projections were made until 2020 including 2015 emission level and taking the 2010 year as a base. In 2020, GHG emission reduction if applying the scenario 'with measures' will be 11% compared to the basic scenario and an 18% reduction under the scenario ' with additional measures'.

The figure below shows the main GHG emitters in Serbia, with the majority due to the energy sector.

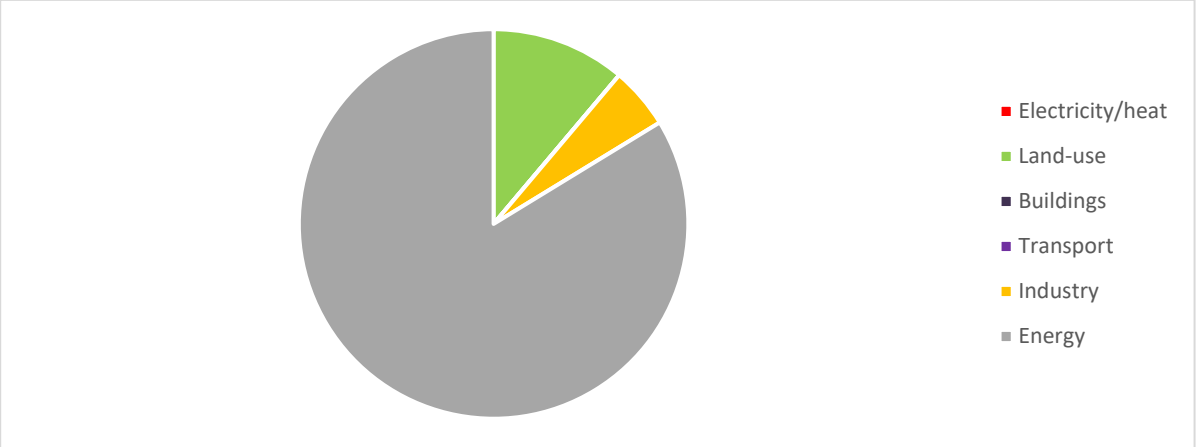


Figure 19: Distribution of GHG emissions by maincsectors for year 2017 (Source: Second Communication to NFCCC, 2017)

2.1.1.8.1. Institutional Framework

Serbia is a member of the Kyoto Protocol and the United Nations Framework Convention on Climate Change. Both conventions have been ratified by Serbia (Official Gazette of the FRY – International Agreements, No 2/97 and Official Gazette of Serbia– International Agreements, No 88/07).

Significant effort has been invested since 2008 to establish the legal, institutional and policy framework on climate change. The process of EU accession and harmonization of national legislation with the EU acquis has started (Serbia was granted candidate status in 2009; the first intergovernmental conference for the start of negotiations was held in 2014; explanatory and bilateral screening of Chapter 27 negotiations took place in September/November 2014).

The Paris Agreement was adopted at the 21st Conference of Parties by United Nations Framework Convention on Climate Change (COP 21), which came into force on 4 November 2016. The Agreement can enter into force only if at least 55 countries ratify the Agreement which represents 55% of global greenhouse gas emissions. Implementation period of the Paris Agreement starts in 2021.The Serbian government adopted the global Paris climate change agreement in May 2017. By adopting the Agreement, Serbia has become a party that ratified the Paris Agreement and committed to contribute to GHG emission reduction on global level.

The UNFCCC encourages the reduction of GHG emissions while Kyoto protocol binds signed parties on reduction of GHG. Serbia, as a non-Annex I Party member, has the obligation to provide information on GHG emissions and integration of climate change in broader development planning process. Reporting related to international climate change conventions is not in the same timeline. There are two types of reporting:

- Communications regarding implementation of UNFCCC, including GHG inventory and program of adaptation and mitigation measures. The timeline for submitting of the report is every 4 years. Up to now the First and Second communications are submitted.
- Biannual Update Report to the UNFCCC including GHG inventory program of mitigation measures and information about Monitoring Mechanism Regulation (MMR).

The following main sources of information are available regarding climate change action in Serbia:

- The first report of Serbia under the UN Framework Convention on Climate Change (2010)
- The “Strategy for Incorporation of Serbia into Clean Development Mechanism (CDM) under the Kyoto Protocol for Waste Management, Agriculture and Forestry sector” (2010)
- First Biennial updated report to the UN Framework Convention on Climate Change (expected by the end of 2015)
- The second report of Serbia under UN Framework Convention on Climate Change
- Action plan for adaptation to changing climatic conditions (in progress)
- Strategies to combat climate change with an action plan (during the selection of partners, the scheduled time of realization 2016-2018)

- Communication on climate change (2017)
- Law on Climate Change (in progress)

2.1.1.8.2. Actions for climate change mitigation

The concept of Nationally Appropriate Mitigation Actions (NAMAs) is one of the key components of climate change mitigation at the international level. The concept implies policies and actions of developing countries in reducing greenhouse gas emissions (GHG) in line with their own capabilities and different responsibilities.

So far, Serbia has developed 12 NAMA projects and submitted the NAMA Registry of the Convention Secretariat. The goal of the NAMA registry is to record NAMA projects in order to provide available assistance in terms of financing, technology transfer and capacity building, as well as for identifying them[xix].

Up to now, the projects are focused on the energy sector, buildings and their energy efficiency and road infrastructure.

2.1.1.8.3. Action on adaptation to climate change

Actions on adaptation to climate change are taken through different projects. The financing mechanism is not developed, and the resources are limited to UNDP, GEF and EU.

One of the projects is the "Climate Strategy and Action Plan". Project is funded by the European Union through the Instrument for Pre-Accession Assistance (IPA funds). It will prepare a cross-sectoral Climate Change Strategy and Action Plan. This will be coordinated by the Ministry of Environmental Protection. The Strategy will establish both a strategic and policy framework for climate action in Serbia in compliance with international obligations and pledges on greenhouse gas mitigation (Paris Agreement and EU accession)[xx].

Regarding NBS (natural based solutions) the new projects should start in September 2018. The project name is Regenerating ECOsystems with Nature-based solutions for hydro-meteorological risk rEduCTion (RECONECT). RECONECT aims to contribute to European reference framework on Nature Based Solutions (NBS) by demonstrating, referencing and upscaling large scale NBS and by stimulating a new culture for 'land use planning' that links the reduction of risks with local and regional development objectives in a sustainable way. this project is under H2020 framework and international project partners.

2.1.2. Institutional setting

Nexus sectors in Serbia are managed institutionally by ministries, institutes and agencies. The table below shows the institutional setting of the analysed sectors. Connections between different ministries are established based on current problems in the sectors. There is no official established body that coordinates connectivity between institutions. However, sector of environment is working closely with sector of agriculture and energy due to the activities related to Chapter 27 (negotiation Chapter in pre-accession phase of entering Serbia to European Union).

Table7: Tabular view of main institutional setting in Serbia

Nexus sector	Ministry of Agriculture, Forestry and Water management	Water Directorate	Ministry of Environmental Protection	Ministry of Mining and Energy	Ministry of Construction, Traffic and Infrastructure	Ministry of Trade, Tourism and telecommunications	Ministry of Finance	Ministry of Economy
Water	*	*	*					
Agriculture and land use	*							
Biodiversity	*		*					
Energy				*				
Economy							*	*
Infrastructure	*			*	*	*		
Climate change			*					

2.1.3. Legislation

The following legislative set is related to nexus sectors in Serbia.

2.1.3.1. Energy

- Law on Energy ("OfficialGazette of Serbia", No. 145/2014)Decree on the Conditions of Supply and Supply of Electricity ("Official Gazette of Serbia", No. 63/13);
- Decree on energy endangered purchaser ("Official Gazette of Serbia", number 113/2015 of 30.12.2015);
- Rulebook on harmonized amounts of realized total monthly income of the household, as conditions for obtaining the status of energy endangered purchaser ("OfficialGazette of Serbia", No. 104/2017)
- Law on Pipeline Transport of Gaseous and Liquid Hydrocarbons and Distribution of Gaseous Hydrocarbons ("Official Gazette of Serbia", No. 104/09)
- Regulation on conditions for the delivery of natural gas ("Official Gazette of Serbia", No. 47/06, 3/10 and 48/10);
- Decree on the Marking of Oil Derivatives ("Official Gazette of Serbia", No. 51/2015 and 5/17);
- Instructions for marking oil derivatives in Serbia ("Official Gazette of Serbia", No. 63/2017) ;
- Law on Efficient Use of Energy ("Official Gazette of Serbia", No. 25/2013)

2.1.3.2. Water

- Law on Water, ("Official Gazette of Serbia", no . 30/2010 and 93 /2012); transposing the EU WFD

2.1.3.3. Agriculture and land use

- Law on Agricultural Land, ("Official Gazette of Serbia", no . 62/2006 and 41 /2009
- Law on Amending the Law on Agricultural Land
- Law on Financing and Securing the Financing of Agricultural Production

- Law on Organic Production
- Law on Forests
- Law on Food Safety
- Law on Genetically Modified Organisms
- Law on Agriculture and Rural Development

2.1.3.4. Biodiversity

- Law on Nature Protection, ("Official Gazette of Serbia", no. 36/2009, 88/2010 and 14/2016)
- Law on National Parks, ("Official Gazette of Serbia", no. 39/93 and 44/93
- Law on Environmental Protection, ("Official Gazette of Serbia" no. 135/2004 and 36 /2009);
- Law on Strategic Environmental Impact Assessment, ("Official Gazette of Serbia", no. 135/2004 and 88/ 2010
- Law on Environmental Impact Assessment, ("Official Gazette of Serbia", no. 135/2004 and 36 /2009)
- Law on Water, ("Official Gazette of Serbia", no . 30/2010 and 93 /2012
- Law on Forests, ("Official Gazette of Serbia", no . 30/2010 and 93 /2012
- Law on Agriculture and Rural Development, ("Official Gazette of Serbia", no . 41/2009 from 2.6.2009)
- Law on Planning and Construction, ("Official Gazette of Serbia", no . 72/2009, 81/ 2009, 64 /2010 24/2011, 121/ 2012, 42/2013 and 50/ 2013)
- Law on Energy, ("Official Gazette of Serbia", no . 57/2011
- Law on the Efficient Use of Energy, ("Official Gazette of Serbia", no. 25/2013)
- Law on Free Access to Information of Public Importance, ("Official Gazette of Serbia", no . 120/2004, 54/2007, 104/2009 and 36/ 2010)

2.1.3.5. Economy development

- Law on Investments "Official Gazette of Serbia" No. 89/2015
- Law on Privatization "Official Gazette of Serbia", no. 83/2014, 46/2015, 112/2015 and 20/2016 - authentic interpretation
- Law On Bankruptcy Proceedings "Official Gazette of Serbia" no. 84/04
- Law On Bankruptcy "Official Gazette of Serbia", no. 104/2009, 99/2011 - dr. law, 71/2012 - decision US and 83/2014

2.1.3.6. Infrastructure

- Law on road transport in road traffic
- Law on road safety
- Law on Electronic Communications ("Official Gazette of Serbia", No. 44/2010)

2.1.3.7. Climate change

- Law on Climate Change (in progress)

The following international agreements in the field of the Nexus sectors Water, Energy, Food and Ecosystems have been undersigned by Serbia:

Multi- or bilateral agreements	Serbia
UNECE Watercourse Convention	15.07.2013
UNECE – Protocol of Health	15.07.2013
Danube River Protection Convention	30.02.2003
Framework Agreement on the Sava River Basin	03.12.2002
Bilateral Shkodra Lake, Drinaand Buna rivers	no

2.1.4. Policies and strategic documents for Serbia

Polices and strategic documents for nexus sectors exist. However, some of the strategies are outdated and they do not address current issues in particular sector. The main comment could be recommendation for update in order to address all sectoral needs and plans. Policy coherence between sectors is not present. The strategic documents for a particular sector do not take into account goals, demands and recommendations from other, cross cutting sectors. In most of sector strategies, the consideration of other Nexus sectors is not considered and hardly mentioned. Therefore, integration of Nexus sectors in different sectors and plans is very low or doesn't exist. It is important to state that Serbia is in the process of accession to the European Union. In this process a lot of sectors, laws, and strategies will be reviewed and adapted to fit 'European' standards. A lot of Nexus sectors are big parts of negotiation chapters. Chapter 27 for example, where the active sectors are: climate change, energy, water and agriculture.

However, there are strategies, for example the Energy Sector Development Strategy, where in the projections up to 2030 year the scenarios developed take into account energy efficiency measures. This is directly connected to climate change sector regarding GHG emissions.

2.1.4.1. Water

- Water Management Base of Serbia (2001)
- Management Strategy (2015)
- Danube RBMP (2009 and updated 2015)

2.1.4.2. Energy

- Action Plan for the Use of Renewable Energy Sources (NAPOIE) ("Official Gazette of Serbia", No. 53/2013)
- Report on the Strategic Assessment of the Influence of the Energy Development Strategy of Serbia until 2025 with projections until 2030 on the environment

2.1.4.3. Agriculture and land use

- Strategy on agriculture development and
- Program for the agriculture development,
- Strategy on Forestry,
- Strategy on biodiversity and
- Strategy on sustainable use of resources

2.1.4.4. Biodiversity

- Strategy on Forestry,
- Strategy on biodiversity
- Strategy on sustainable use of resources

2.1.4.5. Economy development

- Strategy For Improvement Of The Quality Infrastructure System For The Period 2015-2020. Years "Official Gazette of the Republic of Serbia" No. 93/2015
- Draft Strategy for a Harmonized Area for Negotiating Chapter 1
- Draft Action Plan For The Harmonized Area For Negotiation Chapter 1

2.1.4.6. Infrastructure

- Statistical bulletin issued by Statistical Office of Serbia
- Strategy For Improvement Of The Quality Infrastructure System For The Period 2015-2020. Years "Official Gazette of Serbia" No. 93/2015

2.1.4.7. Climate change

- Communication Strategy for Climate Change
- First and Second Communication

2.1.5. Nexus-related overview of Trans-boundary basins/ aquifers

Serbia participates in some of the trans-boundary river basins or aquifers of the SEE2020 region.

International cooperation in the field of water is carried out through *bilateral cooperation*, mainly with neighbouring countries, and through *multilateral cooperation*. This is predominantly carried through the implementation of the Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes of the United Nations, the Convention on the Protection of the Danube River and the Framework Agreement for the Sava River Basin.

Bilateral cooperation has been established with Hungary, Romania, Bosnia and Herzegovina, Croatia, FYROM, Montenegro, and Bulgaria[xxi]. Multilateral cooperation regarding water sector in Serbia is carried out under the UNECE water convention, which was ratified by Serbia in 2010. In addition, for the Danube and Sava, the two biggest rivers in the country, the following conventions are in place:

- Multilateral cooperation on the Danube basin takes place within the framework of the Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention), signed by 11 Danube countries and the EU on 29 June 1994 in Sofia. On 30 January 2003, the Federal Republic of Yugoslavia ratified the Convention for the Protection of the Danube River and issued the Decree on the proclamation of the Law on the Convention on Cooperation on the Protection and Sustainable Use of the Danube River.
- Multilateral cooperation in the field of navigation takes place within the framework of the Danube Commission, an international organization established for the implementation of the Convention on Navigation on the Danube River, signed in

Belgrade on August 18, 1948. The main objective of the Danube Commission is to promote activities that encourage the development of free navigation on the Danube River for all vessels navigating under the flags of the riparian countries.

- Multilateral cooperation on the Sava River Basin is carried out within the framework of the International Commission for the Sava River Basin on the basis of the Framework Agreement for the Sava River Basin, signed on December 3, 2002 in Kranjska Gora.
- Multilateral cooperation on the Tisza basin takes place within the framework of the work of the International Commission for the Protection of the Danube River on the basis of the Memorandum of Understanding signed on December 14, 2004 in Vienna.

The Danube and its sub-basins – namely the Tisza and Sava – flowing to the Black Sea, as well as six basins flowing to the Mediterranean Sea (Krka, Drin, Aoos/Vijosa, Vardar/Axios and Struma/Stymonas) are trans-boundary river basins. They all have associated aquifers, which together with seven additional trans-boundary aquifers not associated to the mentioned river basins, form the trans-boundary groundwater resources. The following trans-boundary basins and aquifers have been identified in the SEE2020 region:

Trans-boundary river basins	Aquifers
Struma/Stymonas	Sandansky-Petrich (BG, EL, MK),
	Pester
Danube	South Western Backa/Dunav aquifer (Serbia, Hungary), Northeast Backa/ Danube -Tisza Interfluve or Backa/Danube-Tisza Interfluve aquifer
- Tisza	North and South Banat or North and Mid Banat aquifer
- **Sava**	Srem-West Srem/Sava, Posavina I/Sava, Kupa, Pleševica/ Una, Macva-Semberija, Lim, Tara massif
-Velika Morava	StaraPlanina/Salasha Montana
- Timok	

Table8: Trans-boundary river basins and aquifers in Serbia[xxii]

The following actions have been undertaken in the recent past by Serbia regarding the improvement of trans-boundary water management through regional projects:

- Western Balkans Investment Framework (WBIF) - Improvement of Joint Flood Management Actions in the Sava River Basin – to ensure a consistent and coordinated approach to flood risk management in the Sava River Basin.
- Environmental and Climate Regional Accession Network (ECRAN) Project - the main objectives are to strengthen regional cooperation between candidate countries and potential candidates in the fields of environment and climate change, and assist in making progress in the areas of transposition and implementation of relevant EU legislation.

- Pilot Project for the Drina River Basin - The primary focus is on an initial exchange of information between experts engaged in the ECRAN Project and water management coordinators in Drina River Basin, associated with the development of Trans-boundary River Basin Management Plans, cross-border cooperation and better implementation of the WFD.

2.1.6. 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. Overall integration is not on a high level as presented in the table below.

	Serbia
Water integrates Energy	medium
Water integrates Food/Agriculture	medium
Water integrates Ecosystems	high
Energy integrates Water	no
Energy integrates Food/Agriculture	no
Energy integrates Ecosystems	medium
Food/Agriculture integrates Water	no
Food/Agriculture integrates Energy	no
Food/Agriculture integrates Ecosystems	no
Ecosystems integrates Water	no
Ecosystems integrates Energy	no
Ecosystems integrates Food/Agriculture	no

Table 9: Integration of Nexus aspects in recent regulation, strategies or plans for the Nexus in the SEE2020 region.

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.

In general, policy coherence between sectors is not strong. Strategic documents for a particular sector do not take into account goals, demands and recommendations from other Nexus sectors, and other Nexus sectors are often not mentioned. It is important to state that Serbia is in the process of accession to the European Union, which will produce a review of policy documents. An example is the Law on Water, (2010/2012) transposing the EU WFD, which thereby considers other sectors. A “Report on the Strategic Assessment of the Influence of the Energy Development Strategy of Serbia until 2025 with projections until 2030 on the environment” has been developed and addresses the interaction between energy and ecosystems. The solutions outlined in this Report are focused on reduction of GHG by constructing more efficient lignite-thermal power plants. This does however not provide solutions to the trade-off between hydropower development and freshwater ecosystem conservation.

Box 1: The “Report on the Strategic Assessment of the Influence of the Energy Development Strategy of Serbia until 2025 with projections until 2030 on the environment

2.1.7. 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[xxiii], 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. This can lead to situations where the sectors are not ready to deal appropriately with climate change.

	Serbia
Water	no
Energy	yes
Food/Agriculture	no
Ecosystems	no

Table 10: Overview on the integration of climate resilience in recent regulation, strategies or plans Serbia

Explanation: "yes" indicated climate change being integrated; "high" indicates contributions to climate change resilience, "low" indicates recognition of climate change constraints; and "no" none of the previous (only textual mentioning). For some of the documents, a screening assessment whether the considerations are of 'high' or 'low' relevance has been carried out.

Climate change regulation set-up is currently in process. The Energy Sector Development Strategy includes projections up to 2030 and the scenarios developed take into account energy efficiency measures; this is directly connected to climate change regarding GHG emissions.

2.1.7.1. 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.

	Serbia
Water efficiency	no
Water reuse	no
Renewable energy sources	no
Energy efficiency	high
Land/soil conservation	no

Organic farming	no
Food waste reduction	no

Table11: Overview on the resource efficiency considerations in recent regulation, strategies or plans in Serbia[xxiv][xxv]

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

	Serbia
Electricity sector	Decrease >25%
Manufacturing sector	Increase >25%
Irrigation	No/slight change
Domestic	Decrease >50%

Table12: Percentage change in water abstractions for Serbia per the 'Sustainability Eventually' scenario under the SCENES project

The (few) projections and quantifications included in the strategies and plans of the economies indicate that such a scenario will likely not be achieved; thus, leading to water use unsustainability in at least part of the region.

The Energy Sector Development Strategy includes projections up to 2030.The scenarios developed take into account energy efficiency measures though with a lower priority than other actions such as modernization and revitalization of hydropower plants and the installation of new small hydropower plants.

2.1.8. Consideration of nature-based solutions

Nature-based solutions are defined as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" [xxvi] and include different concepts such as planning approaches (Integrated Water Resources Management) and infrastructure (Green Infrastructure, Natural Water Retention Measures). As climate change, population growth, and increasing consumption of resources create new threats with implications across the Nexus, nature-based solutions provide flexibility that enables adaptive management that is necessary to cope with changing conditions, and is more likely to sustain benefits in the midst of uncertainty and increased variability[xxvii].

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

	Serbia
Water	no
Energy	no
Food/Agriculture	no
Ecosystems	yes

Table 13: Overview on the consideration of nature-based-solutions in recent regulation, strategies or plans in Serbia.

Serbia is part of the Horizon 2020 project 'Regenerating ECOsystems with Nature-based solutions for hydro-meteorological risk rEduCTion (RECONECT)', which has recently started.

2.2. The role of international action

International agreements, decisions or actions can influence the way thatSEE2020 economies 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 SEE2020 economies have ratified a large number of Nexus-relevant agreements and conventions. In the frame of this study, the implementation details have not been assessed.

	Serbia
Convention on Environmental Impact Assessment in a Trans-boundary Context	2010
Protocol on Strategic Environmental Assessment	2010
Multilateral Agreement among the Economies of South-Eastern Europe for implementation of the Convention on Environmental Impact Assessment in a Trans-boundary Context	2008
Rio Convention on Biological Diversity	2002
Convention on International Trade in Endangered Species of Wild Fauna and Flora	2006
Convention on Conservation of Migratory Species of Wild Animals	2008
Convention on the Conservation of European Wildlife and Natural Habitats	2008
Helsinki Convention on Watercourses and International Lakes	2010
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat	1992
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	2012
United Nations Framework Convention on Climate Change	2001
Kyoto Protocol	2007
Energy Community Agreement	2006
WHO Framework Convention on Tobacco Control	2006

Table 14: International multi- or bilateral agreements/conventions undersigned by Serbia in the different Nexus fields (indicating the year of ratification/adoption

International initiatives have made significant contributions to addressing the Nexus in the SEE2020 region, and – in some cases - to promote decisions that foster synergies. 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 Study does not aim for a full review of the previous studies, thus uncertainties are marked in Table 14

Institution	Start/End	Nexus-related initiative	Nexus sectors					Policies			
			Serbia	Water	Energy	Food	Ecosystems	Institutional capacity building	Resource efficiency	Nature-based solutions	Climate resilience
World Bank	2014-19	Drina Flood Protection Project	x	x		x	?		?	?	?
World Bank	2012-17	Irrigation Development Project in Bosnia and Herzegovina IDP		x		x	?		x		?
World Bank	2014-18	Bosnia and Herzegovina Floods Emergency Recovery Project		x		x	?			?	?
World Bank	2007-16	Agriculture and Rural Development Project		x		x	?		?	?	?
UNDP Bosnia and Herzegovina	2012-16	Integrated Local Development Project ILDP						x			
UNDP Bosnia and Herzegovina	2013-18	Green Economic Development GED			x			x	x		?
UNDP Bosnia and Herzegovina	2009-15	Bosnia and Herzegovina Biomass Energy for Employment and Energy Security Project			x		?	x	x		x
GIZ	2010-16	Energy efficiency advice		x	x			x	x		?
GIZ	2014-17	High-quality, GMO-free soya from the Danube region	x	?	?	x	x		?		
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	?			x		?	?
		MoU Environment (No. 591/12)		x		x	x	x		?	X
ENVSEC	2014	Lepenc River protection via Introduction of Integrated		x		?	?				

Institution	Start/End	Nexus-related initiative	Nexus sectors					Policies			
		Water Management									
UNDP-GEF/GIZ	2006-12	Integrated ecosystem in Management in the trans boundary Prespa Park Region		x			x	x		x	?
GIZ	2012-17	Protection and sustainable use of biodiversity in the territory of Lakes Ohrid, Prespa and Shkodra		x			x	x		?	?
SECO	2012-16	River Basin Management Plan for Bregalnica		x	?	?	?	?	?	x	?
IPA	2009-	River Basin Management Plan for Vardar		x	?	?	?	x	?	?	?
UNDP/GEF	2015-19	Enabling Trans-boundary Cooperation and Integrated Water Resources Management in the Extended Drin River Basin"		x				x[xxviii]			
SDC	2015-21	River Basin Management Plan for Strumica		x				?			?
World Bank	?	Green Growth Strategy		x	x	x	?	x	?	?	?
EU?	2014-20	IPARD	?	?	?	x	?	?	?	?	?
WWF	2009-?	Activities on establishing Natura 2000		?	?	?	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 in the Sava River Basin		x	x	x	x				
UNECE	-2017	Assessment of the water-food-energy-ecosystems nexus and benefits of trans-boundary cooperation in the Drina River Basin	x	x	x	x	x				

Institution	Start/End	Nexus-related initiative	Nexus sectors					Policies			
GEF/UNDP	2009	Prespa Watershed Management Plan		x						x	
EU IPA	2017-	River Basin Management Plan for Vardar		x						x	
BMZ/RCC	2015-2018	Open Regional Fund for South East Europe – Energy Efficiency			x				x		

Table 15: Overview on the current Nexus-related initiatives at the regional level

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

2.2.1. Nexus approach in the trans-boundary water management

The following trans-boundary basins and aquifers have been identified in the economy and region:

Trans-boundary river basins	Aquifers	Economies covered
Struma/Stymonas	Sandansky-Petrich (Bulgaria, Greece, The Former Yugoslav Republic of Macedonia),	Bulgaria, Greece, The Former Yugoslav Republic of Macedonia, 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
Tisza	North and South Banat or North and Mid Banat aquifer (Serbia, Romania)	Hungary, Romania, Serbia, SK, 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	StaraPlanina/Salasha Montana (Bulgaria, Serbia)	Bulgaria, The Former Yugoslav Republic of Macedonia, Montenegro, Serbia
Timok		Bulgaria, Serbia

Table 16: Trans-boundary river basins and aquifers in Serbia[xxix]

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

Trans-boundary river basins or aquifer	Nexus-related challenges	Trans-boundary actions taken or planned	Nexus addressed
Pester	No Nexus-related pressures	No trans-boundary action	
Sava, incl. Macva-Semberija, Lim, Tara massif	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	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 are planned to be prepared by 2012. The project should end by August 2018. [xxx] 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, ME has already been	Sava river aspects have been addressed in the RBMP. No information on actions on aquifers.

	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; 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 BajinaBasta reversible hydropower plant system .	approached by the ISRBC for integration. Montenegro created joint agreementin order to be part of Flood Forecasting and Early Warning System. Regarding Macva-Semberija, groundwater abstraction regulation and quantity monitoring, protection zones, and 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.	
Velika Morava		None specific within the SEE2020 region; action is reported for Serbia-Bulgaria cooperation.	

Table17: Nexus-relevant challenges and corresponding trans-boundary actions in river basins and aquifers in Serbia[xxxi]

3. Conclusions

In the past decade, Serbia has seen a situation of economic growth (e.g. GDP), though with variations, and the Nominal GDP is in the upper range of the SEE2020 region. The primary sector share of the economy has steadily decreased, and the secondary sector has increased, whilst services remain at a stable level, below the proportion it has in other SEE2020 economies.

Based on analysed data, the main Nexus-related challenges are on hydropower (energy-water-ecosystems) and water pollution (food-water-ecosystems); no relevant challenges have been detected between agriculture and energy directly.

Regarding the water sector, there is decline of water consumption, but increase of water usage, mainly due to the increased number of hydropower plants. Furthermore, (trans-boundary) conflicts on water exist on hydropower generation and on agricultural pollution with nitrates and pesticides. A new Water Law has been recently adopted 2012. The Water strategy adopted in 2015 gathers priorities and goals up to 2034. The main targets are: improved and integrated water use, water protection, monitoring, and creation of water information system, improved international cooperation and flood protection. This document creates a pathway within the water sector, for the reorganization, reinforcement of institutional capacities on Economy's and local level. Regarding flood risk management, it's planning and forecasting is improving at the international level in the Sava river; however, no indications have been found for the increased adoption of nature-based

solutions for flood management – such as natural water retention measures – in the relevant strategies and plans. Nature based solutions are about to come through different future projects under the Horizon 2020 research and innovation actions. However, in order to come to integration phase, the Water strategy should be updated.

Serbia is the main energy and electricity producer and consumer in the SEE2020 region, with approx. three times as high electricity consumption as the other economies. Further production increase is foreseen for energy, including the modernization and revitalization of hydropower plants and the installation of new small hydropower plants. These developments can have significant effects on other Nexus sectors, such as water and ecosystems/biodiversity; no full integration of these concerns has been found in the relevant documents. Increase of energy efficiency is also included in Economy level strategies, but with a lower priority.

Serbia has 57% of agriculture land and a significant production compared to consumption.

Regarding ecosystems and biodiversity, Serbia's protected areas cover 6.61% of total territory. There are two Economy level reserves located on border of the economy. Biodiversity data management is not on high level while the strategic documents are adopted (Biodiversity Strategy, Forestry Strategy, and Strategy on sustainable use of resources).

The planning and management of the Nexus sectors is competence of different administrations, including a set of Ministries at the Economy level, with several of them having responsibilities e.g. for water and ecosystems. No official body has been appointed to assure cross-Nexus sector coordination at the Economy level, nor have relevant coordination mechanisms been established. However, the sector of environment is working closely with sectors of agriculture and energy due to the activities related to Chapter 27 (negotiation for pre-accession phase of entering Serbia into the European Union).

Regarding the legislation, the most recent new adoptions refer to water (2012), nature protection (2016) and environmental impacts (2013); no cross-sector integration has been identified for the Nexus sectors.

Strategies and plans are in place for all sectors (e.g. water 2015, energy 2013), but cross-sector integration is rather scarce. However, a “Report on the Strategic Assessment of the Influence of the Energy Development Strategy of Serbia until 2025 with projections until 2030 on the environment” has been developed and addresses the interaction between energy and ecosystems. The solutions outlined in this Report are focused on reduction of GHG by constructing more efficient lignite-thermal power plants (which does however not provide solutions to the trade-off between hydropower development and freshwater ecosystem conservation).

As conclusion, Serbia should explore further ways to strengthen legislatively, administratively and for planning and implementation purposes the Nexus between water, energy, food and ecosystems, aiming for synergies, as e.g. via climate change adaptation, nature-based solutions (NBS) or energy efficiency approaches.

4. Annexes

4.1. References

4.1.1. Acronyms

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

Table 2: Acronyms

Acronym	
BHD	Birds and Habitats Directives
CAP	Common Agricultural Policy
CCS	Carbon Capture and Storage
DG	Directorate General
DRBMP	Danube River Basin Management Plan
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
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	Trans-boundary 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
yr	Year

4.1.2. 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 trade-offs, 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[xxxii]
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).[xxxiii]
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[xxxiv]
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[xxxv]
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[xxxvi]
Synergies	The creation of a whole that is greater than the simple sum of its parts[xxxvii]
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[xxxviii]
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)[xxxix]
Strategic document	These include policy papers, strategies, action or investment plans, communications, key projects or similar initiatives

4.1.3. Literature references

The following literature has been used to develop the Study:

- Water Management Base of Serbia (2001)
- Water Management Strategy (2015)
- Sector Development Strategy Of Serbia For The Period up to 2020 with projections up to 2030 (2016)
- Strategy on agriculture development and
- Program for the agriculture development,
- Strategy on Forestry,
- Strategy on biodiversity
- Strategy on sustainable use of resources
- http://www.nationalredlist.org/
- http://www.nbs.rs/internet/cirilica/80/index.html
- webrzs.stat.gov.rs
- BuR Biannual Update Report to the UNFCCC
- Climate change mitigation http://www4.unfccc.int/sites/nama/SitePages/SearchResults.aspx?k=serbia&cs=This%20Site&u=http%3A%2F%2Fwww4.unfccc.int%2Fsites%2Fnama
- The First report of Serbia under the UN Framework Convention on Climate Change (2010)
- The Second report of Serbia under the UN Framework Convention on Climate Change (2017)
- Communication on Climate Change (http://www.klimatskepromene.rs/vesti/strategija-komunikacije-za-oblast-klimatskih-promena/)
- Report 'Serbia Floods 2014' http://www.sepa.gov.rs/download/SerbiaRNAreport_2014.pdf
- AERS annual report (2016): https://aers.rs/Files/Izvestaji/Godisnji/Eng/AERS%20Annual%20Report%202016.pdf
- Macroeconomyindicators: http://www.nbs.rs/internet/cirilica/80/index.html
- World Resource Institute: World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 2.0, 2017)
- http://www.savacommission.org/dms/docs/dokumenti/events/workshop_on_flood_risk_management_measures_and_links_to_eu_wfd/presentations/11.pdf
- The first report of Serbia under the UN Framework Convention on Climate Change (2010)
- The Second report of Serbia under the UN Framework Convention on Climate Change (2017)
- Communication on Climate Change (http://www.klimatskepromene.rs/vesti/strategija-komunikacije-za-oblast-klimatskih-promena/)

4.1.4. Regional information sources

This Annex includes the information sources identified in Task 2.

Table 4: Regional information sources

Information source	Details
tbd	tbd

4.1.5. Institutions contacted

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

Table 5: Institutions contacted

Institution contacted	Details
Institute for the development of Water Resources "Jaroslav Cerni"	ZivanovicSnezana
The Republic Fund for Development and Restructuring of Economy	Aleksandra Uzelac

[i]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
[ii]http://www.srbija.gov.rs/pages/article.php?id=20617
[iii] Nexus Assessment Excel Sheet
[iv]BBC News Online, Balkan Floods: Fears of new surge on Serbia's River Sava, 18 May 2014.
[v] http://www.mei.gov.rs/eng/documents/agreements-with-eu/agreement-on-the-energy-community-for-south-eastern-europe/
[vi]http://www.sepa.gov.rs/download/SerbiaRNAreport_2014.pdf
[vii]https://aers.rs/Files/Izvestaji/Godisnji/Eng/AERS%20Annual%20Report%202016.pdf
[viii]Energy Sector Development Strategy Of The Republic Of Serbia For The Period up to 2020 with projections up to 2030 (2016)
[ix]Daccache et al., 2014
[x]http://www.gornjepodunavlje.net/o-rezervatu/osnovni-podaci
[xi]Convention on Biological Diversity https://www.cbd.int/countries/profile/default.shtml?country=rs#facts
[xii]http://www.stat.gov.rs/
[xiii]http://www.nbs.rs/internet/cirilica/80/index.html
[xiv]http://www4.unfccc.int/submissions/INDC/Published%20Documents/Serbia/1/Republic_of_Serbia.pdf
[xv] Source: https://www.climatewatchdata.org/countries/SRB?calculation=ABSOLUTE_VALUE
[xvi]World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 2.0, 2017)
[xvii]WRI CAIT data show that the LUCF sector was a substantial carbon sink between 2006 and 2010, absorbing on average 64.82 MtCO2e during this period. Between 2011 and 2013, WRI CAIT data show that LUCF removals dropped dramatically to an average of 1.29 MtCO2e during this period. As this sharp reduction in the size of the sink from 2010 to 2011 caused us to question the reliability of the LUCF data, LUCF sector emissions are excluded from the total GHG emission estimates in this factsheet and are not shown in the graphs
[xviii] First Communication to UNFCCC
[xix] http://www4.unfccc.int/sites/nama/SitePages/SearchResults.aspx?k=serbia&cs=This%20Site&u=http%3A%2F%2Fwww4.unfccc.int%2Fsites%2Fnama
[xx]http://www.serbiaclimatestrategy.eu/about/
[xxi]http://www.rdvode.gov.rs/lat/medjunarodna-saradnja-bilateralna.php
[xxii] Source: Nexus Assessment
[xxiii]Climate change scenarios for The Former Yugoslav Republic of Macedonia and Kosovo* indicate overall increases in air temperature (DrinCorda, 2018)

[xxiv]For some of the documents, a screening assessmentwhether the considerations are of 'high' or 'low' relevancehasbeen carried out; for others a 'yes' or 'no' isstated
[xxv] 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
[xxvi]IUCN, 2018
[xxvii]Ozment, DiFrancesco& Gartner, 2015
[xxviii] Including multi-stakeholder dialogue
[xxix] Source: UNECE, 2011
[xxx] http://www.savacommission.org/dms/docs/dokumenti/events/workshop_on_flood_risk_management_measures_and_links_to_eu_wfd/presentations/11.pdf
[xxxi] Source: Nexus Assessment
[xxxii]Wikipedia
[xxxiii]Adapted from Wikipedia
[xxxiv]Wikipedia
[xxxv]Wikipedia
[xxxvi] Wikipedia
[xxxvii]Wikipedia
[xxxviii]Wikipedia quoting Hufty, Marc (2011).
[xxxix]Wikipedia