INTERREG V-A COOPERATION PROGRAMME
GREECE – BULGARIA 2014 – 2020
Reinforcing Protected Areas Capacity through an Innovative Methodology for Sustainability
– BIO2CARE –
(Reg. No: 1890)

WP3

Deliverable 3.1

One (1) study collecting information and producing knowledge regarding anthropogenic activities and status of nature (incl. SWOT analysis) of the areas

Contributing Partners

LB - Democritus University of Thrace - Laboratory of Environmental Management and Industrial Ecology
PB4 - Greek Biotope/Wetland Centre
PB6 - Regional Inspectorate of Environment and Waters - Blagoevgrad
PB7 - Rila National Park
PB8 - South-West University "Neofit Rilsky"

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Table of Contents

Chapter 1: Introduction – Definition of study areas and their significance

The goal of this study is to collect information and produce knowledge regarding the anthropogenic activities and status of nature of the protected areas: 1) National Park of Eastern Macedonia and Thrace in Greece (NP-EMATH) (Study Area 1) and 2) Rila National Park of Bulgaria (RNPD) including the catchment area of the river basin of Blagoevgradska Bistrica (Study Area 2). The information presented in this study serves as the basis to identify and analyze the special characteristics and basic needs of the examined areas, thus facilitating the development of efficient decision support tools and monitoring systems.

In Chapters 2 and 3 the current situation of the Study Areas 1 and 2 is respectively presented, including analytical inventories and data on key issues that affect the environmental sustainability of the examined systems. More specifically, the status of nature (including geographic, flora, fauna and other natural characteristics) is analytically described whereas key anthropogenic activities (such as demographics, energy analysis, transport activity, building stock, tourist activity, agricultural, and livestock and industrial activity) are quantified and presented. In Chapter 4 a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is performed and presented for the two Study Areas, with a view to identify major internal and external factors that are important for developing a strategy towards sustainable development and protecting the biodiversity of NP-EMATH and RNPD. In Chapter 5, a benchmark analysis is conducted comparing the two Study Areas with each other and with other National Parks in Greece, Bulgaria and worldwide. Under this framework, key issues such as annual number of visitors, covered area in hectares, environmental challenges/problems are compared. Finally in Chapter 6, the main conclusions are summarized and future directions are provided.

Following a holistic approach, the areas under focus will be not only the areas of absolute protection but also neighboring areas where anthropogenic activity is intense. In this way, the results of the Project BIO2CARE will benefit not only the protection of natural environment and biodiversity of the areas, but also local communities through the development and adoption of circular economy and green entrepreneurship strategies. Additionally this will further strengthens the applicability and scope of the results since they will cover a wide typology of protected areas. The total area of the National Park of Eastern Macedonia and Thrace is approximately 93,000 Ha. Within the territory of NP-EMATH, habitats of significant biodiversity and ecological value are in coexistence with extensive human activities (urban, rural, tourist, industrial). On the other hand, the Rila National Park has very limited anthropogenic activity (mostly tourism) within its territory. In that aspect the BIO2CARE territorial scope will include not only the eligible 36% of the RNPD territory (≈29,200 Ha) but also the catchment area of Blagoevgradska Bistritza (≈23,400 Ha), an area with increased - compared to Rila - anthropogenic load. Concluding, the areas under study will extend to approximately 145,600 Ha (Study Area 1 (GR): 93,000

Ha, Study Area 2 (BG): 52,600 Ha). AII proposed areas fall within the eligible spatial boundaries of the Interreg V-A Greece-Bulgaria 2014-2020 Cooperation Programme.

National Park of Eastern Macedonia and Thrace

NP-EMATH is the land and water area that includes the wetlands of Delta Nestos, Lake Vistonida, Lake Ismarida and surrounding areas (Joint Ministerial Decision 44549 – Government Gazette D497/17.10.2008) (Figure 1-1).

Figure 1-1: The geographical boundaries of NP-EMATH (Study Area 1).

The NP-EMATH area constitutes a geographical part of the Kavala, Xanthi and Rodopi Regions and the six municipalities (Nestos, Topeiros, Avdira, Iasmos, Komotini and Maronia-Sapes). Forty-three (43) villages are located in the area, whereas close to 29,000 people (over 10,000 households) are living within the boundaries of NP-EMATH. The Municipality of Nestos, which is one of the Beneficiaries of the Project BIO2CARE, constitutes the municipality with the highest coverage of NP-EMATH (29% of total area). The institutionalized managing authority of NP-EMATH is the Management body of the Nestos Delta and Lakes Vistonida – Ismarida, also a member of the BIO2CARE partnership.

The wetland complex of NP-EMATH is one of the most significant in Greece due to the extent of the area it covers and its important biological, aesthetic, geomorphologic and pedagogical value. Within its territory there are: 1) the Nestos Delta consisting of seven lagoons and a tributary forest, 2) the Lake Vistonida and the complex of nine lagoons and 3) the Lake Ismarida (Figure 1-2). The aim of the National Park is to effectively protect the habitats and the rare species of flora and fauna that are endemic and reproduce in these areas.

Figure 1-2: View of the Nestos Delta and Lakes Vistonida and Ismarida.

The NP-EMATH is organized in three major zones and several sub-zones, ranging from zones of absolute protection (A) to zones where anthropogenic activities of mild and/or medium intensity are permitted and coexist (C). Zone A is designated as a nature conservation area and includes sub-zones A1, A2, A3, A4 and A5. Zone B is designated as an area of protected natural formations, landscapes and their elements and includes the sub-zones B1, B2, B3, B4 and B5. Zone C is designated as an eco-development area and includes sub-zones C1 and C2. In this study, information regarding all three zones will be collected. The regional zone D1 is the land area in close proximity but out of the boundaries of NP-EMATH.

Rila National Park

At 81,046 hectares, Rila National Park is the largest of the three National Parks in Bulgaria and among the largest in all of Europe. It was established in 1992 to conserve the natural ecosystems and inherent diversity of the area's plant and animal species, habitats of rare and endangered species and communities, and to protect and conserve scenic and characteristic landscapes, and geologic natural formations. The Park is located in the southwest of Bulgaria. There are 27,565 hectares of unforested

area along the mountain ridges and 53,481 hectares of coniferous and deciduous forests in the lower altitudes. The Park encompasses close to 30% of the Rila Mountain.

Pursuant to the Protected Areas Act, conservation of wildlife in Rila National Park is the responsibility of the Park Directorate, which is directly subordinated to the Ministry of the Environment and Waters. Among the goals of the Park Directorate is to preserve and maintain biological diversity and protect wildlife, and to foster scientific research as well as opportunities for developing tourism and ecologically sound sources of livelihood for the local population. All activities within the Park are carried out under the direction of a ten year Management Plan, approved by the Council of Ministers (Cabinet) of the Republic of Bulgaria. Park staff is authorized to control the operation and supervise the activities of any organizations, institutions, conservationists and users within the Park territory. They also monitor the biological resources of the Park.

Park personnel offer assistance to visitors, provide for their safety, enforce rules and prevent violations. The National Park Directorate comprises a Central Office, based in Blagoevgrad, and eight local branch offices responsible for management of the respective nine Park sections: Blagoevgrad, Belitsa, Yakoruda, Belovo, Kostenets, Borovets, Beli Iskar, Govedartsi, and Dupnitsa. A Visitors' Center operates at the Resort Complex of Panichishte and town of Samokov and provides information and guidance to tourists and visitors to Rila National Park.

Rila National Park is within the territory of four administrative regions and eleven municipalities: Blagoevgrad, Simitli, Razlog, Belitsa, Yakoruda, Belovo, Kostenets, Dolna Banya, Samokov, Sapareva Banya and Dupnitsa. There are approximately 1,400 species of vascular plants, 282 species of mosses and 130 species of freshwater algae. The fauna is represented by 48 species of mammals, 99 species of birds, 20 species of reptiles and amphibian and 5 species of fish, as well as 2,934 species of invertebrates, of which 282 are endemic.

Figure 1-3: The geographical boundaries of Rila National Park.

Rila National Park encompasses some of the most secluded forest ecosystems virtually sheltered from human impact. Most representative in the Park are spruce and fir, in combinations with the endemic Macedonian pine and dwarf pine. About 95% of these are natural forests, averaging 100 years in age. This wide diversity of habitats has deservedly earned Rila National Park its second place ranking in the NATURA 2000 European Ecological Network. Since 2001 Rila National Park Directorate successful implements Rila National Park Management Plan. The management of natural components has several aims: to develop and maintain the network of reserves in the Park; to preserve the natural condition of various types of ecosystems in individual vegetation belts including lake and lake-side habitats; to preserve natural condition of populations of significance for conservation; to ensure the availability of areas for biological exchange; to maintain an optimum level of available information and of the long-term biomonitoring system; to preserve the natural condition of typical and unique elements of landscape; to limit the harmful impact caused by the hydropower network and by the exploitation of water resources; and to limit the development of infrastructure in the Park to the management needs.
The long-term objectives are implemented by way of programs and projects - 24 basic program groups and 71 projects whose long-term implementation would lead to the achieving of the management objectives in the planned period of time. These programs and projects consider various levels of management – from individual population or individual tourist and participant in the interpretation programs to the management of groups of ecosystems.

The National Park has started the process of developing the Sustainable Management for the area of the park and the 12 surrounding municipalities. In this process the park administration has engaged in dialogue with the municipalities, NGOs and national authorities in the educational, science, nature protection and tourism sector, presented of small and large tourism businesses. In the discussions and dialogues held during the environmental companies and a lot of meetings all the stakeholders confirmed that they support sustainable management of the protected area and many of them are interested to involve of biodiversity conservation activities and develop eco-tourism services. Local communities around the park are interested in organizing and implementing of Interpretation and Educational Programs and Community Income Generations Programs.

Figure 1-4: View of the alpine part of the Rila National Park.

Figure 1-5: Brown bear (Ursus arctos) and Deer (Mustela nivalis) in Rila National Park.

Bistritza river catchment area

The main river in Bistritza river catchment area is Blagoevgradska Bistritza River. The springs of river Blagoevgradska Bistrica are situated at 2546 meters above sea level near the summit of Goliam Mechi vrah (Big bear peak) in South-West Rila Mountain. From the beginning the river flows to the South and after it pass Macedonia hut the river turn to the wests and as a wild mountain river it crosses the Parangalitza reserve area. In the upper part of the catchment area the valley of the river is deep and covered with old coniferous forests. After the boundaries of Rila National park the river grows bigger mainly due to large tributaries that come from the left. In the middle part of the catchment area the Valley of Blagoevgradska Bistritza River is v-shaped and after the village of Bistrica it turns to the South-West and flows into Struma River. In the lower part of the catchment area the river forms a giant alluvial fan on the top of which is situated the city of Blagoevgrad.

The area covered by the catchment area is 234 km^2. The upper part of the area is situated in the boundaries of Rila National Park and because of that it possess very limited anthropogenic load. Lower part of the catchment area coincides with the populated areas of Blagoevgrad municipality and has significant anthropogenic influence. The average river discharge is 3.17 m^3/s. The maximum discharge is during the spring (May-June) and the minimum is February. In the lower part of the the catchment area the water of the river is used for irrigation. Blagoevgradska River are situated the villages of Bistritza, Dabrava, Harsovo and the city of Blagoevgrad.

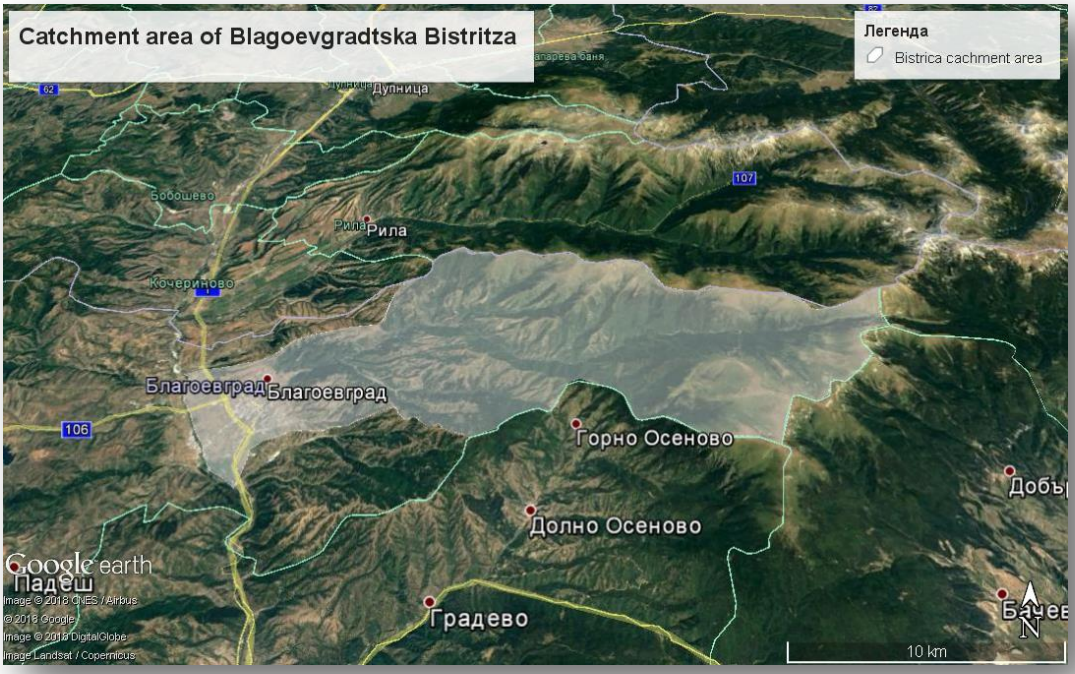


Figure 1-6: The geographical boundaries Blagoevgradtska Bistritza river catchment area.

Blagoevgrad is a city in southwestern Bulgaria, the administrative centre of Blagoevgrad Municipality and of Blagoevgrad Province, with a population of 70,881 inhabitants (as of 2011). It lies on the banks of the Blagoevgradska Bistritsa River. The city is the economic and cultural centre of southwestern Bulgaria. It is located in the valley of the Struma River at the foot of the Rila Mountains, 101 kilometers (63 miles) south of Sofia, close to the border with FYROM. Blagoevgrad is home to two universities, the South-West University "Neofit Rilski" and the American University in Bulgaria. Attractions in the surrounding area include the resort Bodrost. Because of the large number of students (partly due to the South-West University and the American University in the city), its cross-road location, nature and number of social factors, the city has relatively well developed economy. The district has the sixth largest economy in Bulgaria, for its share of the GDP, after the more industrial districts of Sofia City, Varna, Sofia District, Plovdiv, and Burgas. The number of people registered as unemployment is slightly below 10%, less than the average for the country.

Chapter 2: Study Area 1- National Park of Eastern Macedonia and Thrace (GR)

2.1 Status of Nature of Study Area 1

2.1.1 Geographical characteristics

The National Park of Eastern Macedonia and Thrace (NP-EMATH) is located in the southern part of the Region of Eastern Macedonia and Thrace. It extends along the coasts of the Thracian Sea, in three prefectures (from the southeast end of the Prefecture of Kavala, in the Prefecture of Xanthi and up to the southeastern boundaries of the Prefecture of Rhodope) and six municipalities (Nestos, Topeiros, Avdira, Iasmos, Komotini and Maronia-Sapes).

The National Park of Eastern Macedonia and Thrace (NP-EMATH) was established in 1996, by a Joint Ministerial Decision issued for the protection of the area. As of 2008, the National Park is under the Joint Ministerial Decision 44549/2008 (OJ 497 D). It is zoned in three major zones and several sub-zones (Fig. 1), ranging from zones of absolute protection (A) to zones where anthropogenic activities of mild and/or medium intensity are permitted to co-exist (C).

Zone A is designated as a nature conservation area and includes sub-zones A1, A2, A3, A4 and A5. Zone B is designated as an area of protected natural formations, landscapes and their elements and includes the sub-zones B1, B2, B3, B4 and B5. Zone C is designated as an eco-development area and includes sub-zones C1 and C2. Regional zone D1 refers to the area in close proximity but out of the boundaries of NP-EMATH. It occupies an area of approximately 93,000 ha, including the buffer zone (72,678 ha of which are terrestrial)[1] and is thus ranked among the largest wetland parks in Greece. Since 2003, the National Park is under the responsibility of the Nestos Delta - Vistonida - Ismarida Management Body (http://www.fd-nestosvistonis.gr/).

NP-EMATH comprises an extensive complex of coastal wetlands e.g. from Nea Karvali lagoons, Nestos delta, Lakes Vistonida and Ismarida and the surrounding lagoons till Lissos River. The important features of this coastal wetland complex form a unique habitat for many important species. These features are given in detail in chapter *2.1.4. Other natural characteristics*.

[1] *Certain deliverables of the project concern the whole entity of NP-EMATH, whereas other deliverables, such as monitoring and infrastructure, are scheduled to focus on the Nestos river delta, an approximate area of 30,000 ha.*

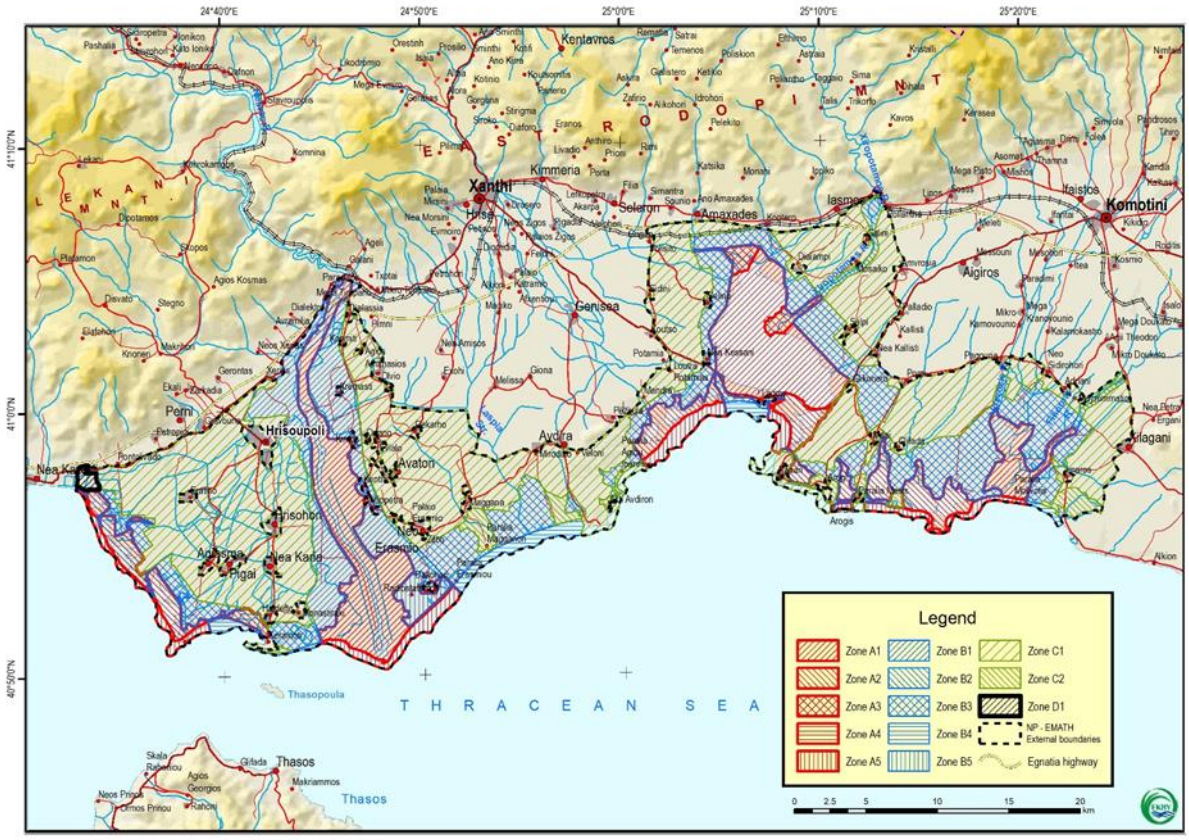


Figure 2-1: Major protection zones of NP-EMATH.

Protection status

It is also one of the most important wetland complexes in Greece, Europe and worldwide due to its high biological, geomorphological, aesthetic, educational and economic value. In brief, the following protection acts reflect the significance of the National Park:

- The Ramsar Convention on Wetlands of International Importance. "*The Vistonida, Porto Lagos and Ismarida lakes and the neighbouring lagoons*" (~24,400 ha) was designated in 1971.
- The Barcelona Convention for the Special Protected Areas.
- The Bern Convention for the protection of wild life and biotopes in Europe.
- The Bonn Convention for the protection of migrating animals.
- The Directive 2009/147/EC (79/409/EEC) on the conservation of wild birds. Three Special Protected Areas (SPAs) have been designated by Joint Ministerial Decision 37338/1807/2010 (OJ 1495 B) and are part of the Natura 2000 network in Greece:
  - *GR1130010 "LIMNES VISTONIS, ISMARIS - LIMNOTHALASSES PORTO LAGOS, ALYKI PTELEA, XIROLIMNI, KARATZA"* (17,697.92 ha, 15.49% of which marine)
  - *GR1130012 "KOILADA KOMPSATOU"* (16,492.95 ha, terrestrial)
  - *GR1150001 "DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS KAI NISOS THASOPOULA"* (14,773.69 ha, 20.91% of which marine)
- The Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

Three Special Areas of Conservation (SACs) have been designated by Law 3937/2011 (OJ 60 A) and are part of the Natura 2000 network in Greece:

- *GR1130006 "POTAMOS FILIOURIS"* (1,727.64 ha, terrestrial)
- *GR1130009 "LIMNES KAI LIMNOTHALASSES TIS THRAKIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI"* (28,605.99 ha, 15.96% of which marine)
- *GR1150010 "DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI"* (23,028.11 ha, 18.13% of which marine)

Natura 2000 network sites

The Sites of the Natura 2000 network (SPAs and SACs, designated under the Birds and Habitats Directives, respectively) within the borders of NP-EMATH are of particular importance for the protection and conservation of the areas' biodiversity (Fig. 2).

Figure 2-2: Sites of the Natura 2000 network (SPAs and SACs) within the borders of NP-EMATH.

<u>*Special Protection Areas (SPAs)*</u>

GR1130010 *"LIMNES VISTONIS, ISMARIS - LIMNOTHALASSES PORTO LAGOS, ALYKI PTELEA, XIROLIMNI, KARATZA".* The site includes several coastal lakes and the outflow of Kosynthos, Kompsatos and Filiouris rivers. The largest one, Vistonida lake is half brackish-half freshwater and receives inflow from Kosynthos and Kompsatos rivers. Ismarida lake (former lake Mitrikou) receives inflow from Filiouris river and Valtos, Elos, Ptelea, Alyki, Karatza, Xirolimni, Lafri-Lafrouda and Porto Lagos lagoons, presenting

high salinity. The Messi and Lafri-Lafrouda lagoons have salinas (Nea Kessani). In the north, the tertiary-formed Mount Rhodope rises. There is also an alluvial delta of the rivers Kosynthos and Kompsatos. The rivers outlet to the lake and the riverbeds form small wetland habitats. The wetlands have a great ecological value for Greece and Europe, as they host remarkable biodiversity (some of the most important bird populations occur here). The overlap of the Natura 2000 site GR1130010 with nationally designated protected areas is shown in Table 2-1, below.

Table 2-1. Relation of the Natura 2000 site GR1130010 (SPA) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR08	Ethniko Parko Anatolikis Makedonias kai Thrakis - Periochi prostasias tis fysis	70,08
GR95	Kompsatou Dimou Iasmou	15,33
GR95	Xirolimni Dimou Aigeirou	1,05
GR95	Alyki Dimou Aigeirou	1,97
GR95	Karatza Dimou Aigeirou	1,14
GR95	Ptelea Dimou Aigeirou	1,74
GR95	Elos Dimou Aigeirou	1,39
GR95	Limni Vistonida - Lagous Dimou Avdiron	25,87
GR95	Fanari-Porto Lagos	2,55
GR95	Mavromatio-Limni Mitrikou	4,89
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	95,36
GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	4,04
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	21,25

*CODE explanation. *GR08: Nature reserve zone in National Park, GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

GR1130012 *"KOILADA KOMPSATOU".* The valley is surrounded by hills with deciduous forests (mainly mature grazed oak forest), scrub and grassland. The main human activity is livestock-farming. The area is particularly important for rare and endangered birds, such as the Syrian woodpecker, the semi-collared flycatcher and the Ortolan Bunting as well as for breeding and passage raptors. The overlap of the Natura 2000 site GR1130012 with nationally designated protected areas is shown in Table 2-2, below.

Table 2-2. Relation of the Natura 2000 site GR1130012 (SPA) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR95	Kechrou - Kerasias Koinotitas Kechrou	5,12
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	0,02

GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	0,01
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	0,01

*CODE explanation. *GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

GR1150001 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS KAI NISOS THASOPOULA"*. The site is a very important wetland due to its large and its rich habitat types. It is a valuable part of a wetland chain included between Axios river and Evros Delta of north Greece. However, its importance has declined due to the lack of protection. This includes agricultural land with few freshwater lagoons separated from the sea by narrow sandy strips. Only a relict area of the previously extended riverine forest (Kotza Orman) remains along the river course near the river mouth and the poplar plantation. Reeds also occur along the river beds and canals. There is also a rocky islet (island of Thassopoula). In the area of Chrysoupolis there are freshwater lakes with reedbeds and water lilies. In the northern part of the river on the steep cliffs, rich vegetation and diverse fauna occur. Most of the area of Nestos river is embanked by retaining dykes so that to be separated from the cultivated land. The Keramoti lagoons are a complex of coastal saltwater lagoons, situated at the western extreme of Nestos Delta in the west of Keramoti town. In the proximity of the area there are an airport and installations of an abandoned U.S. military radio station. The overlap of the Natura 2000 site GR1150001 with nationally designated protected areas is shown in Table2-3, below.

Table 2-3. Relation of the Natura 2000 site GR1150001 (SPA) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR08	Ethniko Parko Anatolikis Makedonias kai Thrakis - Periochi prostasias tis fysis	56,63
GR95	Kotza Orman Nestou Dimou Topeirou	41,17
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	90,89
GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	1,65
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	32,61

*CODE explanation. *GR08: Nature reserve zone in National Park, GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

Special Areas of Conservation (SACs)

GR1130006 *"POTAMOS FILIOURIS".* The site includes part of the river. which springs from the eastern part of Mount Rhodope and flows into the Thracian Sea, east of Ismarida lake. The area is a steep-sided valley with oak forests and pastures. The new name of the area Potamos-Koilada Filiouri is Lissos river. It is threatened mainly by reforestation of Pines in open oak forest, by road construction and by development in general. Nevertheless, abundant relics of riparian forest exist along the river as well as scattered inside the different agricultural cultivations. The river provides freshwater to the near-to-sea

wetlands. The overlap of the Natura 2000 site GR1130006 with nationally designated protected areas is shown in Table2-4, below.

Table2-4. Relation of the Natura 2000 site GR1130006 (SAC) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR95	Arrianon - Neas Santas Dimon Arrianon - Sapon	4,84
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	8,45
GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	5,32
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	3,13

*CODE explanation. *GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

GR1130009 *"LIMNES KAI LIMNOTHALASSES TIS THRAKIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI".* It includes some of the most important coastal lakes - wetlands of Greece and Europe (Vistonida and Ismarida lakes, five shallow lagoons, part of Filiouris river). The largest one, Vistonida lake is half brackish - half freshwater and has inflow from the rivers Kosynthos and Kompsatos. On the other hand, the lagoons Mitrikou, Valtos, Elos, Ptelea, Alyki, Karatza, Xirolimni, Lafri-Lafrouda and Porto lagos are saline. Lake Messi and Lafri-Lafrouda have salinas (Nea Kessani). Different habitats, such as large reedbeds, *Tamarix* scrubs (largest in Greece), salt marshes, dunes, bordering macchia hills and agricultural cultivation extend close to the wetland plain and are bordered by tertiary hills. In the north tertiary Mount Rhodope raises. There is also an alluvial Delta. Remarkable is their diversity in biotopes and wildlife species, as well as the important bird populations existing here. The overlap of the Natura 2000 site GR1130009 with nationally designated protected areas is shown in Table 2- 5, below.

Table 2-5. Relation of the Natura 2000 site GR1130009 (SAC) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR08	Ethniko Parko Anatolikis Makedonias kai Thrakis - Periochi prostasias tis fysis	43,74
GR95	Kechrou - Kerasias Koinotitas Kechrou	0,04
GR95	Kompsatou Dimou Iasmou	10,66
GR95	Xirolimni Dimou Aigeirou	0,65
GR95	Alyki Dimou Aigeirou	1,23
GR95	Karatza Dimou Aigeirou	0,71
GR95	Ptelea Dimou Aigeirou	1,07
GR95	Elos Dimou Aigeirou	0,86
GR95	Limni Vistonida - Lagous Dimou Avdiron	16,02
GR95	Fanari-Porto Lagos	1,59

CODE*	SITE NAME	COVER (%)
GR95	Mavromatio-Limni Mitrikou	6,25
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	91,73
GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	9,32
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	38,67

*CODE explanation. *GR08: Nature reserve zone in National Park, GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

GR1150010 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI".* The site is a very important wetland due to its large and its rich habitat types. It is a valuable part of a wetland chain included between Axios river and Evros Delta of north Greece. However, its importance has declined due to the lack of protection. This includes agricultural land with few freshwater lagoons separated from the sea by narrow sandy strips. Only a relict area of the previously extended riverine forest (Kotza Orman) remains along the river course near the river mouth and the poplar plantation. Reeds also occur along the river beds and canals. There is also a rocky islet (island of Thassopoula). In the area of Chrysoupolis there are freshwater lakes with reedbeds and water lilies. In the northern part of the river on the steep cliffs, rich vegetation and diverse fauna occur. Most of the area of Nestos river is embanked by retaining dykes so that to be separated from the cultivated land. The Keramoti lagoons are a complex of coastal saltwater lagoons, situated at the western extreme of Nestos Delta in the west of Keramoti town. In the proximity of the area there are an airport and installations of an abandoned U.S. military radio station. The overlap of the Natura 2000 site GR1150010 with nationally designated protected areas is shown in Table2- 6, below.

Table 2-6. Relation of the Natura 2000 site GR1150010 (SAC) with nationally designated protected areas.

CODE*	SITE NAME	COVER (%)
GR08	Ethniko Parko Anatolikis Makedonias kai Thrakis - Periochi prostasias tis fysis	41,51
GR21	Chrysoupoli Kavalas	0,01
GR95	Kotza Orman Nestou Dimou Topeirou	36,42
GR96	Ethniko Parko Anatolikis Makedonias kai Thrakis	90,59
GR99	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	4,10
GR99	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	44,98

*CODE explanation. *GR08: Nature reserve zone in National Park, GR21: Game breeding station, GR95: Wildlife Refuge, GR96: National Park, GR99: Other*

2.1.2 Flora

Vegetation and flora of NP-EMATH

The wetlands of the National Park of Eastern Macedonia and Thrace host a remarkable variety of vegetation units typical of wetlands, thus creating a natural environment valuable for the conservation of Greek fauna. Indicatively, the following vegetation types and dominant flora species are mentioned in the area.

Important vegetation types and habitats of NP-EMATH

Posidonia beds (*Posidonion oceanicae*)

It is a priority habitat type (*1120) under the Habitats Directive (Annex I) and the overall assessment of its Conservation Status is Inadequate and declining (U1-). The beds of this marine plant (Posidonia oceanica), endemic to the Mediterranean, occur in substrata with thick or fine sand, in depths of 1 to 60 meters. Posidonia species belongs to angiosperms (superior plants), which, unlike algae, have roots, leaves, flowers and fruits, just like terrestrial plants. Posidonia meadows, also known as the sea forests, are among the richest and most valuable Mediterranean ecosystems.

Sandflats

Where the sea meets the lagoons, sand creates a special place where only specially adapted plants such as Sea daffodil (Pancratium maritimum), European beachgrass (Ammophila arenaria), Common saltwort (Salsola kali), Sea spurge (Euphorbia paralias, Euphorbia peplis), Spiny cocklebur (Xanthium spinosum), Golden thistle (Scolymus hispanicus), Yellow star-thistle (Centayrea solstitialis) and Seaside eryngo (Eryngium maritimum).

Salt meadows and ponds

In the lagoons, flat areas were formed that are periodically flooded by brackish or salty waters. Halophytes (salt tolerant) plants such as the Sea purslane (*Halimione portulacoides*) and Glasswort (*Salicornia europea*) find habitat here. Particular adaptations to this adverse environment have also been developed by certain bird species.

Juncus beds

These are large stretches for farm animals to graze. In the meadows, the Sea rush (*Juncus maritimys*), sharp rush (*Juncus acutus*), *Bermuda grass* (Cynodon dactylon), Cynosurus sp., Marrybium and Polygonum sp. occur. In these sites, many raptors and other wintering bird species are looking for food.

Reeds

Arundo donax and *Typha latifolia*, are present almost everywhere, in lakes, marshes, canals, and shore. Their stands make an ideal nesting place for many bird species, such as seagulls, cormorants, herons, marshmallows and goblins.

Tamarisk shrubs

Tamarix sp. occur in the periphery of reeds, offering ideal places for small birds (such as the nightingale) to nest and composing spectacular spring landscapes.

Hydrophilous forests

Sycamores, poplars, willows, shrubs and elms grow on the banks and deltas of the rivers in the area, forming ideal breeding grounds for many raptor bird species.

Hills

Covered with typical Mediterranean shrubs, this habitat is of great importance for raptors, as they can easily inspect their hunting areas.

Arable land

This is a special, manmade habitat created by agricultural activities. Though poor in wildlife due to the intense human presence, it hosts certain bird species (e.g. stork) that feed on the crops.

Important flora species of NP-EMATH

Alnus glutinosa (Alder)

It is a deciduous tree, which can reach up to 20-30 meters in height. Mature trees have a dark brown bark with several cracks. The Common alder forms dense stands in rivers and streams. Known from Homer's era as Clethre, it owes its scientific name (glutinosa=glue) to its sticky new leaves. The extract produced by its bark has astringent properties and treats a sore throat. A natural, orange-coloured dye extracted from the bark, was used to dye fabrics, and in tanning.

Fraxinus angustifolia (Ash tree)

Ash may reach up to 10-25 meters in height and flowers from March to April. Its white, smooth and durable wood is used in furniture making, sculpture and poles. In the past, it was also used to make airplane propellers. Ancient Macedonians made their 6-meter spears sarisa from the Ash wood. The bark is used as a deep blue dye for fibres, in tanning and also is known as a remedy for fever.

Platanus orientalis (Plane)

Plane is a long-lived, deciduous tree, 20-30 meters in height. Plane is abundant everywhere in Greece, almost along every stream and river, in deltas or small springs growing from sea level up to 1,200-1,300 meters' altitude. Its leaves often cause allergies in spring. Plane wood is heavy and hard, easily treated only when damp.

Populus nigra (Black poplar)

Black poplar grows on riverbanks and lakeshores all over Greece. Its crown is wide, the bark is thick and turns bluish and furrowed vertically as it ages. Its height may reach up to 25-30 meters in height. It blooms from April until the end of May. The wood is white, soft, poriferous and fibrous. It is of less economic value than the white poplar.

Salix alba (White willow)

The White willow of Theophrastus is a deciduous tree, with a height of 6 to 30 meters. Spread all over Greece, it grows on riverbanks and lakeshores, from the sea level up to mountainous areas. It is a fast growing photophilous species that forms thick stands, stabilising the soil. It can stand inundation by running water but not by stagnant. White willow flowers in April–May; its flowers form catkins. Its bark has therapeutic properties. Hippocrates produced a decoction from the bark and used it against fever and pain. The German chemist Mayer isolated salicylic acid (the basic content of aspirin) from the bark of White willow.

Hedera helix (Ivy)

Ivy is a very common climbing plant. It is an evergreen shrub climbing into aerial roots. It is tolerant to shade more than any other climbing plant and may form a carpet in dump soils under trees. Dioscourides identified two species according to the colour of their fruit, white ivy and black ivy. Its wood is spongy and light. It may replace cork and can be used as a sharpener. The leaves have pharmaceutical properties but its fruits are poisonous, though not for birds.

Phragmites australis (Water reed)

The water reed, with its tall, hard stem –which can grow over 4 metres in height– has blade-shaped leaves and flowers. The plant can survive periods of drought (of 1 to 3 months) provided that the soil remains moist.

Iris pseudacorus (Yellow flag iris)

The leaves of Iris come from the plant stem and are broad, blade-like and approximately as long as the shoot (40-150 cm). Its yellow flowers attract insects in the spring, whereas their shape ensures pollination, as the insect, in its attempt to reach the nectar deep inside the flower, gets covered in pollen and transfers it to other flowers.

Vegetation and flora per specific area

Nestos river, Keramoti lagoons and Chrysoupoli lakes

Nestos riparian forest, the lagoons at Keramoti, the lakes at Chrysoupoli, the reed beds on the river and lake banks, the salt marshes and swamps, the sand dunes on the coastal zone and many other habitats support an enormous diversity of flora and fauna rendering the estuary a unique area of great ecological importance. Nestos flora consists of about 500 species. In the wider area of Nestos delta, the typical vegetation includes plants growing on the sandy soil of the dunes of the coastal zone, halophytes that need salty soils and cover a large area in the Keramoti lagoons, and aquatic plants, such as Water lilies (*Nymphea alba*) and water lentils that float on the surface. Stands of reeds are distributed at the Nestos delta and wet meadows with rushes occur around the fish farms of Vassoa and Koumbourou. *Tamarix* scrub grow in small stands throughout the area. Nestos riparian forest is unique in size in Greece and one of the finest in Europe (Fig. 2.3).

Figure 2-3: Nestos riparian forest. Photo archive EKBY / L. Logothetis.

Its vegetation comprises of tree species such as Elm (*Ulmus* sp.), Ash (*Fraxinus angustifolia*) and Oak (*Quercus pedunculiflora*), while closer to the water species such as Poplar (*Populus alba*), Willow (*Salix alba*, *Salix fragilis* and *Salix* sp.) and Alder (*Alnus glutinosa*). Riparian galleries are formed by various climbing species, the most common of which are *Hedera helix*, *Vitis vinifera sylvestris*, *Smilax aspera*, *Humulus lupulus* and *Periploca graeca*. Various shrubs species are also abundant in the area, the most common of which are *Crataegus* sp. and *Sabucus nigra*. Concerning the herbaceous species, the presence of *Iris pseudacorus* and of more than 25 orchid species is also important. At the Chrysoupoli lakes, the vegetation consists of water lilies, water chestnuts, rushes and reeds.

Lake Vistonida

The northern and southern banks are surrounded by extensive reed beds and saltwort, as well as by periodically submerged marshes of saltwater and freshwater. On the banks of the Kosynthos and Kompsatos rivers that flow into the lake, willows, sycamores, alders, poplars, ash and elm trees grow abundantly. Near the village of Lagos there are two small pine forests, one of which is home to a large colony of herons.

Lake Ismarida

The lake hosts a remarkable number of plants; the aquatic, forest and meadow plants exceed 220 species. Water lilies (*Nymphea alba*), water chestnuts (*Trapa natans*), pondweed, water lentils and other aquatic plants grow in its waters. The open waters are surrounded in some places by very dense local reed and thicket beds, a valuable breeding habitat for birds, fish and amphibians. The reeds hide saltwater and freshwater marshes and halophilus scrubs. On the north side of the lake, at the mouth of Vosvozis river, stands a small grove of riparian willow, poplar, alder, elm and ash trees, unique in the region.

Rhodope lagoons

The lagoons of Rhodope are surrounded by extensive salt marshes. In the small zone that separates the lagoons from the sea, the sandy or saline soil is covered by a mosaic of vegetation, which, depending on the season, displays a different shade. Saltworts dominate and rushes grow mostly in places that are often flooded by rainwater.

Marine part of NP-EMATH

In the marine part of the National Park, the *Posidonia* beds (*Posidonia oceanica*) are of particular importance for the reproduction of other marine species (invertebrates and fish), but also for the recycling of various substances / nutrients in the marine environment. It is a particularly fragile ecosystem, characteristic of the Mediterranean Sea, which is threatened by extinction due to human activities. The presence of the *Posidonia* beds is evident by the quantities of dead leaves on the shores of NP-EMATH during winter months. *Posidonia* beds are ecosystems of very high productivity, as they provide for nutrition, shelter and reproduction fields for many fish species, including species of high commercial value.

Vegetation and flora per Natura 2000 site

Special Protection Areas (SPAs)

GR1130010 *"LIMNES VISTONIS, ISMARIS - LIMNOTHALASSES PORTO LAGOS, ALYKI PTELEA, XIROLIMNI, KARATZA".*

Extensive reedbeds, *Tamarix* scrubs (one of the largest in Greece), salt marshes, dunes, maquis vegetation occur in the area, providing habitat to birds. Also agricultural cultivation extending close to the wetland plain and a bordering by tertiary hills complement the landscape. Regarding the wild growing plant taxa that grow in the site, the most important are the aquatic plants *Salvinia natans* (floating fern) and *Trapa natans* (Water chestnut) as well as *Pancratium maritimum* (Sea daffodil) which is seriously endangered by human activities on the coast.

GR1130012 *"KOILADA KOMPSATOU".*

The valley is surrounded by hills with deciduous forests (mainly mature grazed oak forest), scrub and grassland. The main human activity is livestock-farming.

GR1150001 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS KAI NISOS THASOPOULA"*.

The most important habitat types are large coastal dunes, saltmarshes, reedbeds, and especially beds of marine vegetation-communities of vascular plants (*Zostera*, *Posidonia* etc.). In the present site *Salvinia natans*, a plant species included in the list of the World Conservation Monitoring Centre, United Nations Environment Programme (WCMC-UNEP), as well as *Pancratium maritimum*, a plant seriously endangered by the human activities on the coast, are growing wild.

Special Areas of Conservation (SACs)

GR1130006 *"POTAMOS FILIOURIS".*

The river and surrounding area are dominated by riparian vegetation and flora species, indicative of the moist soils. Freshwater habitats of both standing and running waters, as well as forests, temperate and Mediterranean deciduous, are distributed in the area. The main habitat types of Community interest within the site's area are shown in Table 2-7, below.

Table 2-7. Habitat types in the Natura 2000 site GR1130006 (SAC), their cover (ha) and degree of conservation (A: excellent, B: good, C: average or reduced).

CODE	NAME	COVER (ha)	CONSERVATION
3170*	Mediterranean temporary ponds		
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of *Salix* and *Populus alba*	27,08	C
91F0	Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (Ulmenion minoris)	1,54	C
92A0	*Salix alba* and *Populus alba* galleries	163,53	C
92C0	*Platanus orientalis* and *Liquidambar orientalis* woods (Platanion orientalis)	112,85	B
92D0	Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae)	12,57	B

GR1130009 *"LIMNES KAI LIMNOTHALASSES TIS THRAKIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI".*

Typical of the site are the wild growing aquatic plants *Salvinia natans* (floating fern) and *Trapa natans* (Water chestnut) as well as the many coastal and halophytic habitats (1110 to 1420), dunes, some freshwater habitats, Mediterranean grasslands and forests, temperate and Mediterranean deciduous. The main habitat types of Community interest within the site's area are shown in Table 2-8, below.

Table 2-8. Habitat types in the Natura 2000 site GR1130009 (SAC), their cover (ha) and degree of conservation (A: excellent, B: good, C: average or reduced).

CODE	NAME	COVER (ha)	CONSERVATION
1110	Sandbanks which are slightly covered by sea water all the time		A
1120*	Posidonia beds (Posidonion oceanicae)		B
1130	Estuaries	31,58	B
1140	Mudflats and sandflats not covered by seawater at low tide		B
1150*	Coastal lagoons	6437,18	C
1170	Reefs		A
1210	Annual vegetation of drift lines	15,59	C
1310	Salicornia and other annuals colonizing mud and sand	17,50	A
1410	Mediterranean salt meadows (Juncetalia maritimi)	1225,42	A
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	1521,06	A
2110	Embryonic shifting dunes	17,63	B
2120	Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')	45,08	A
2190	Humid dune slacks	5,61	A
2220	Dunes with *Euphorbia terracina*	35,50	A
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	0,59	
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	70,89	C
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of *Salix* and *Populus alba*	253,72	B
6420	Mediterranean tall humid grasslands of the Molinio-Holoschoenion	685,86	A
91M0	Pannonian -Balkanic turkey oak-sessile oak forests	136,66	C
92A0	*Salix alba* and *Populus alba* galleries	179,37	B
92D0	Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae)	1942,63	A

GR1150010 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI"*

Typical of the site is the wild growing aquatic plants *Salvinia natans* (floating fern). The most important habitat types are large coastal dunes, saltmarshes, reedbeds, the many coastal and halophytic habitats (1110 to 1420), dunes, some freshwater habitats, Mediterranean grasslands and forests, temperate and Mediterranean deciduous. The main habitat types of Community interest within the site's area are shown in Table2- 9, below.

Table 2-9. Habitat types in the Natura 2000 site GR1150010 (SAC), their cover (ha) and degree of conservation (A: excellent, B: good, C: average or reduced).

CODE	NAME	COVER (ha)	CONSERVATION
1110	Sandbanks which are slightly covered by sea water all the time		A
1130	Estuaries	17,86	B
1140	Mudflats and sandflats not covered by seawater at low tide		A
1150*	Coastal lagoons	849,68	B
1170	Reefs		
1210	Annual vegetation of drift lines	34,07	C
1310	Salicornia and other annuals colonizing mud and sand	23,01	A
1410	Mediterranean salt meadows (Juncetalia maritimi)	1632,68	B
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	424,97	A
2110	Embryonic shifting dunes	85,42	A
2120	Shifting dunes along the shoreline with Ammophila arenaria ('white dunes')	107,28	A
2190	Humid dune slacks	13,58	B
2220	Dunes with Euphorbia terracina	80,19	A
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	11,21	B
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba	422,58	B
62A0	Eastern sub-mediterranean dry grasslands (Scorzoneratalia villosae)	332,53	B
6420	Mediterranean tall humid grasslands of the Molinio-Holoschoenion	1127,64	B
91E0*	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)	513,85	A
91F0	Alnion incanae, Salicion albae)	157,45	B
92A0	*Salix alba* and *Populus alba* galleries	623,62	A
92D0	Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae)	672,52	A

2.1.3 Fauna

Fauna of NP-EMATH

The National Park of Eastern Macedonia and Thrace hosts a great variety of animal species, many of which are rare and endemic. Mammals, amphibians and reptiles, fish, insects and other invertebrates, and of course birds use the wetlands complex as an ideal habitat to feed, reproduce and nest, to live as permanent residents or as ordinary visitors.

Important fauna species of NP-EMATH

Mammals

Canis aureus (Jackal)

The Golden jackal is a medium-sized predator and omnivore, with a range covering the southern parts of the Palearctic, South Asia and northeastern Africa. The entire jackal population is now confined to a few clusters grouped into seven sub-areas, with criteria such as connectivity and isolation. The Golden jackal has disappeared from central and western Greece and is currently confined in discontinuous, isolated population clusters in the Peloponnese, Fokida, Samos isl., Halkidiki and northeastern Greece. The largest population cluster was found in Nestos-Vistonida area. The causes of decline seem to be related to limited habitat availability due to changes in human agro-pastoral activities, which resulted mainly in reduced day-cover availability and possibly reduced food-base. The species is considered as Endangered (EN) in Greece and as Least Concerned (LC) globally and is protected at European level (Annex V of the Directive 92/43/EEC).

Lutra lutra (Otter)

Otters are widespread throughout much of the mainland in Greece and are also found on some islands. They are more frequent in the northeast of the country. They are distributed in a wide range of aquatic habitats, in freshwaters, rivers, streams, canals, lakes, marshes and deltas. Main threats to the population include habitat degradation, drainage of wetlands, destruction of riparian cover, construction of dams along many rivers, intensification in the use of chemicals. The species is considered as Endangered (EN) in Greece and as Near Threatened (NT) globally and is protected at European level (Annexes II & IV of the Directive 92/43/EEC).

Fish

Alburnus vistonicus (Vistonis shemaja)

Endemic to Lake Vistonida basin, including Kossinthos and Kompsatos rivers. The populations from the adjacent Filiouris and Vosvozis river basins probably belong to this fish species. A lacustrine species that migrates to the upper reaches of stream tributaries to spawn in riffles with strong currents. Dams and weirs block its upward migration, endangering localized populations. In the Vistonida basin, populations have sharply declined particularly due to anthropogenic salinity changes in the lake and are further threatened by a planned dam and water abstraction projects. It reaches up to 25 cm TL. The species is considered as Critically Endangered (CR) in Greece and globally and is protected at European level (Annex II of the Directive 92/43/EEC).

Oxynoemacheilus bureschi (Struma stone loach)

A common central Balkan fish species (Greece, Bulgaria and FYROM), endemic to Balkans. In Greece, the species is found from Axios to Nestos river drainages, also in Lake Vistonida basin and the endoreic Nevrokopi streams. A small benthic species that inhabits fast-flowing waters (usually found in the riffle sections of a river) with stony to gravelly substrates. It reaches up to 11 cm TL. The species is considered as Least Concerned (LC) in Greece and globally.

Birds

Hoplopterus spinosus (syn. *Vanellus spinosus,* Spur-winged plover)

The first breeding case of the species in Greece was confirmed in 1959 (in Porto Lagos) and since then the species is a regular but rare and local summer visitor in our country. The species breeds only along the coastal zone of Thrace, particularly in the deltas of Nestos and Evros. Only 20-50 pairs breed at the Thracian wetlands and mainly at Nestos and Evros deltas. Greece and Cyprus are the only European countries where the species nests. The species is considered as Vulnerable (VU) both in Greece and globally and is protected at European level (Annex I of the Directive 2009/147/EC).

Phasianus colchicus colchicus (Black-necked pheasants, Common pheasant)

In the past, the species was quite widespread in Greece and numerous in populations, breeding as far south as Sterea Ellada. Since then their population has undergone a dramatic decline and today the species is restricted in only one small area of Thrace (Nestos delta), with a declining population. The species is considered as Critically Endangered (CR) in Greece and as Least Concerned (LC) globally and is protected at European level (Annex II of the Directive 2009/147/EC).

Anser erythropus (Lesser white-fronted goose*)*

Greece is the most important area for the migrating Lesser white-fronted goose. Nestos delta and Ismarida Lake are two of the four Greek stops during its winter trip.

Haliaeetus albicilla (Sea eagle)

Three out of six pairs occurring in North Greece live in the National Park. The Sea eagle is one of the largest European eagles with wind width ranging from 1.90-2.40 m.

Ardea alba (Great egret)

Among the rare species of birds, the Great egret is reproduced by a very small population. In winter, however, the Great egret appears with large populations, and overwinters in many wetlands.

Fauna per specific area

Nestos river

A few decades ago, mammals such as *Lynx lynx*, *Capreolus capreolus* and *Cervus elaphus* (deer) occurred in the Nestos region. Today, large and medium-sized mammals are living in the area: *Sus scrofa, Canis aureus, Vulpes vulpes, Felis sylvestris, Martes martes*, otter (*Lutra lutra*), *Meles meles, Mustela nivalis* etc. As for the species of fish fauna that live in the river, lakes and lagoons of the delta, the most important are *Cyprinus carpio carpio, Mugil cephalus, Barbus* sp., *Rutilus rutilus* and *Tinca tinca*. There are also 11 species of amphibians, of which *Triturus vulgaris, Triturus cristatus* and *Pelobates syriacus* are rare. Some of the 22 species of Nestos reptiles are *Emys orbicularis, Mauremis caspica, Testudo hermanni, Testudo graeca, Natrix tesselata* and *Elaphe quatorlineata*.

However, the group of animals that is predominant in the area of Nestos is the birds. About 300 bird species are nesting or feeding here, including *Vanellus spinosus, Egretta garzetta, Ardeola ralloides, Platalea leucorodia, Phalacrocorax carbo*, the cormorants (*Phalacrocorax carbo, Phalacrocorax*

pygmeus), *Plegadis falcinellus, Phalacrocorax aristotelis, Gallinula chloropus, Phoenicopterus roseus, Bubo bubo, Tyto alba*, *Parus caeruleus*, *Troglodytes troglodytes* and *Remiz pendulinus*. A typical species of Nestos riparian forest is the pheasant (*Phasianus colchicus colchicus*), which nests only in this area. Thirty-three out of the 300 bird species are birds of prey, including *Circus pygargus, Milvus migrans, Aquila clanga, Haliaeetus albicilla, Aquila pomarina, Falco naumanni*, *Circaetus gallicus* and *Aquila chrysaetos*. At Nestos delta occur seven globally threatened species and 12 endangered species, at the European level. In addition, Nestos delta is the most important breeding area for the species *Hoplopterus spinosus.*

Lake Vistonida

The fish fauna of the lake numbers about 20 species, however, many marine species also enter from the mouth connecting the lake with the sea, bringing the total number up to nearly 40 species. The Vistonis shemaja (*Alburnus vistonicus*, endemic to Lake Vistonida basin), the European carp (*Cyprinus carpio*), the Aegean gudgeon (*Gobio bulgaricus,* an endemic species of the Balkans), the Freshwater blenny (*Salaria fluviatilis*), the European bleak (*Alburnus alburnus*), the Prussian carp (*Carassius gibelio*), the Thracian barbel (*Barbus cyclolepis*), the Dark vimba (*Vimba melanops*), the Vardar nase (*Chondrostoma vardarense*), the Maritza chub (*Squalius orpheus*, an endemic species of the Balkans), the European bitterling (*Rhodeus amarus*), the Struma stone loach (*Oxynoemacheilus bureschi*, an endemic species of the Balkans) and Struma spined loach (*Cobitis strumicae*, an endemic species of the Balkans), are some of the fish that live in the freshwaters. Most of the above species are included in the Annexes of the Habitats Directive and are thus protected in European level. On the other hand, various fish species of commercial interest, such as European eel (*Anguilla anguilla*), bass (*Dicentrarchus labrax*), mullet (*Chelon haematocheilus*), bream (*Sparus aurata*), sole (*Solea vulgaris*), live in the brackish waters. Since 1991, the Big-scale sand smelt (*Atherina boyeri*) reproduces in the lake, while the Thracian shad (*Alosa vistonica*) that is endemic to the lake seems to have disappeared, probably due to the fact that the salinity of the lake has increased.

The lake and surrounding vegetation are also home to amphibians (great crested newt, marsh frogs, tree frogs, agile frogs, pilovates, bobbins, green toads) and reptiles (terrestrial and aquatic turtles, water snakes, four-lined snakes, ratsnakes, vipers, European green lizards, etc.), many of which are listed in Annexes of the Habitats Directive. These are two species of amphibians (*Triturus cristatus* and *Bombina variegata*), six species of reptiles (Mediterranean turtle - *Testudo hermanni*, Greek turtle - *Testudo graeca*, *Emperor orbicularis - Mauremys caspica, Elaphe quatuorlineata, Elaphe situla*), an insect (*Lucanus cervus*) and five species of mammals (Otter *Lutra lutra* and the bats *Rhinolophus ferrumequinum, Rhinolophus hipposideros, Miniopterus schreibers* and *Myotis myotis*). Concerning mammals, worth noting is the frequent presence of the jackal (*Canis aureus*) and the wolf (*Canis lupus*) in the broader area. Moreover, Foxes (*Vulpes vulpes*), wild cats (*Felis sylvestris*) and squirrels (*Spermophilus citellus*), have also been observed around the lake.

However, Lake Vistonida is also supporting a great variety of bird species; 326 birds are found here. In addition to the herons of Porto Lagos, Eurasian spoonbills (*Platalea leucorodia*), avocets (*Recurvirostra avosetta*) and the black-winged stilt (*Himantopus himantopus*) breed in the area. In

recent years, a growing population of flamingo (*Phoenicopterus roseus*) has been feeding and reproducing, while thousands of gulls, herons, storks, glossy ibis (*Plegadis falcinellus*), as well as hundreds of raptors, make a stop in the region during their migration. During migration, a large numbers of White pelicans (*Pelecanus onocrotalus*) is also found in the area, while Dalmatian pelicans (*Pelecanus crispus*) are present throughout the year, as Lake Vistonida is, together with Lake Kerkini, the most important wintering site for the species in Europe and the Mediterranean. Until the end of the 1960s, at least one pair of White-tailed Eagle (*Haliaeetus albicilla*) was nestling in the mouth of Kompsatos.

Lake Ismarida

In its waters, a great variety of fish species occur, such as *Cyprinus carpio carpio*, *Scardinius erythropthalmus* and *Anguilla anguilla*, while a number of amphibians and reptiles lives in the waters and surrounding vegetation. Some of them are common species (e.g. tree frog, green toad), while other species, such as *Triturus cristatus* and *Bombina variegata*, are protected at European level, listed in Annexes of Directive 92/43/EEC.

In the broader area of Ismarida a large number of mammals occurs, most notably the Otter *Lutra lutra* and the bats *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Miniopterus schreibers* and *Myotis myotis*, which are listed in Annex II of the Directive 92/43/EEC. Other species such as the jackal (*Canis aureus*) and the wolf (*Canis lupus*), foxes (*Vulpes vulpes*), wild cats (*Felis sylvestris*) and lobsters (*Spermophilus citellus*) are also present in the area.

The lake hosts a rich birdfauna, which numbers 233 bird species, 118 of which nest in the area. It is one of a few Greek wetlands where species such as the *Vanellus vanellus*, *Locustella luscinioides*, *Acrocephalus schoenobaenus* and *Emberiza schoeniclus*, nest. It also retains one the last colonies of *Platalea leucorodia* in Greece, while in the last few decades, a large number of flamingos (*Phoenicopterus roseus*) have been observed (3,300 birds, one the largest populations in the country).

Rhodope lagoons

Concerning the fish fauna, the lagoons hosts the species *Mugil cephalus*, *Anguilla anguilla*, *Dicentrarchus labrax*, *Solea vulgaris*, *Sparus aurata*, etc. In the wider area of the lagoons, more than 160 bird species have been recorded. More than 300 Dalmatian pelicans spend the winter here, while many more are observed during the migration season. In winter, swans, geese, ducks, herons, cormorants, gulls and other species migrate from the harsh winter weather of Scandinavia or Russia and flock to the lagoons to feed and rest until early February, when they begin their return to the northern regions again.

Fauna per Natura 2000 site

Special Protection Areas (SPAs)

GR1130010 *"LIMNES VISTONIS, ISMARIS - LIMNOTHALASSES PORTO LAGOS, ALYKI PTELEA, XIROLIMNI, KARATZA".*

The area is important for breeding, passage and wintering waterbirds and raptors, and breeding species associated with reedbeds. Several bird species have their national strong holds here. Moreover, the total Greek and European populations of others, breed in those wetlands, that are protected under the Ramsar Convention. All birds of Community interest within the site's area are shown in Table 2-10, below.

Table 2-10. Bird species of Community interest (Annex I, Birds Directive) in the Natura 2000 site GR1130010 (SPA), their type (p: permanent, r: reproducing, c: concentration, w: wintering) and degree of conservation (A: excellent, B: good, C: average or reduced).

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
1	*Accipiter brevipes*	r	B	92	*Haematopus ostralegus*	r, w	B
2	*Acrocephalus arundinaceus*	r	B	93	*Haliaeetus albicilla*	c, r	B
3	*Acrocephalus melanopogon*	c	B	94	*Hieraaetus pennatus (Aquila pennata)*	c	B
4	*Acrocephalus palustris*	c	B	95	*Himantopus himantopus*	r	B
5	*Acrocephalus schoenobaenus*	r	B	96	*Hippolais (iduna) pallida*	r	B
6	*Acrocephalus scirpaceus*	r	B	97	*Hippolais icterina*	c	B
7	*Actitis hypoleucos*	c	B	98	*Hippolais olivetorum*	r	B
8	*Alauda arvensis*	p	B	99	*Hirundo daurica*	r	B
9	*Alcedo atthis*	r, w	B	100	*Hirundo rustica*	r	B
10	*Anas acuta*	w	B	101	*Ixobrychus minutus minutus*	r	B
11	*Anas clypeata*	r, w	B	102	*Lanius collurio*	r	B
12	*Anas crecca crecca*	r, w	B	103	*Lanius minor*	r	B
13	*Anas penelope*	w	B	104	*Lanius nubicus*	r	B
14	*Anas platyrhynchos platyrhynchos*	r, w	B	105	*Lanius senator*	r	B
15	*Anas querquedula*	c, r	B	106	*Larus (Chroicocephalus) ridibundus*	r, w	B
16	*Anas strepera strepera*	r, w	B	107	*Larus canus*	w	B
17	*Anser albifrons albifrons*	w	B	108	*Larus genei*	w	B
18	*Anser anser*	w	B	109	*Larus melanocephalus*	c	B
19	*Anser erythropus*	w	B	110	*Larus minutus*	c	B
20	*Anthus campestris*	r	B	111	*Limosa lapponica*	w	B
21	*Anthus cervinus*	c	B	112	*Limosa limosa limosa*	c	B
22	*Anthus pratensis*	c	B	113	*Locustella luscinioides*	r	B
23	*Anthus spinoletta*	w	B	114	*Lullula arborea*	w	B
24	*Anthus trivialis*	c	B	115	*Luscinia megarhynchos*	r	B
25	*Apus apus*	r	B	116	*Melanocorypha calandra*	p, r	B
26	*Aquila clanga*	w	B	117	*Mergellus albellus*	w	B
27	*Ardea cinerea cinerea*	r, w	B	118	*Mergus serrator*	w	B
28	*Ardea purpurea purpurea*	r	B	119	*Merops apiaster*	r	B
29	*Ardeola ralloides ralloides*	r	B	120	*Milvus migrans*	c	B
30	*Arenaria interpres*	w	B	121	*Motacilla alba*	r	B
31	*Asio flammeus*	r, w	B	122	*Motacilla cinerea*	w	B

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
32	*Asio otus*	p, r		123	*Motacilla flava*	r	B
33	*Aythya ferina*	r, w	B	124	*Muscicapa striata*	r	B
34	*Aythya fuligula*	w	B	125	*Neophron percnopterus*	c	B
35	*Aythya nyroca*	r, w	B	126	*Numenius tenuirostris*	c	B
36	*Botaurus stellaris stellaris*	r	B	127	*Nycticorax nycticorax nycticorax*	c	B
37	*Branta ruficollis*	w	B	128	*Oenanthe hispanica*	r	B
38	*Bubo bubo*	w	B	129	*Oriolus oriolus*	r	B
39	*Burhinus oedicnemus*	r	B	130	*Otus scops*	p, r	B
40	*Buteo buteo*	r, w	B	131	*Oxyura leucocephala*	w	B
41	*Buteo rufinus*	c, w	B	132	*Pandion haliaetus*	c	B
42	*Calandrella brachydactyla*	r	B	133	*Passer hispaniolensis*	r	B
43	*Calidris alba*	w	B	134	*Pelecanus crispus*	c, w	B
44	*Calidris alpina alpina*	w	B	135	*Pelecanus onocrotalus*	c, w	B
45	*Calidris ferruginea*	c	B	136	*Pernis apivorus*	r	B
46	*Calidris minuta*	c, w	B	137	*Phalacrocorax aristotelis desmarestii*	r, w	B
47	*Calidris temminckii*	c	B	138	*Phalacrocorax carbo sinensis*	w	B
48	*Caprimulgus europaeus*	r	B	139	*Phalacrocorax pygmaeus*	w	B
49	*Charadrius alexandrinus alexandrinus*	r, w	B	140	*Phalaropus lobatus*	c	B
50	*Charadrius hiaticula*	r, w	B	141	*Philomachus pugnax*	c	B
51	*Chlidonias hybrida*	r	B	142	*Phoenicopterus roseus*	c, w	B
52	*Chlidonias leucopterus*	c	B	143	*Phoenicurus ochruros*	w	B
53	*Chlidonias niger*	c	B	144	*Phoenicurus phoenicurus*	c	B
54	*Ciconia ciconia ciconia*	r	B	145	*Phylloscopus collybita*	w	B
55	*Ciconia nigra*	r	B	146	*Phylloscopus sibilatrix*	c	B
56	*Circaetus gallicus*	r	B	147	*Phylloscopus trochilus*	w	B
57	*Circus aeruginosus*	r, w	B	148	*Picus canus*	r, w	B
58	*Circus cyaneus*	w	B	149	*Platalea leucorodia leucorodia*	w	B
59	*Circus macrourus*	c	B	150	*Plegadis falcinellus falcinellus*	c	B
60	*Circus pygargus*	w	B	151	*Pluvialis apricaria*	w	B
61	*Coracias garrulus*	r	B	152	*Pluvialis squatarola*	w	B
62	*Coturnix coturnix*	r	B	153	*Podiceps cristatus cristatus*	r, w	B
63	*Cuculus canorus*	r	B	154	*Podiceps nigricollis nigricollis*	r, w	B
64	*Cygnus columbianus bewickii*	w	B	155	*Porzana parva*	c	B
65	*Cygnus cygnus*	w	B	156	*Porzana porzana*	c	B
66	*Cygnus olor*	r, w	B	157	*Porzana pusilla intermedia*	c	B
67	*Delichon urbicum (urbica)*	r	B	158	*Puffinus yelkouan*	w	B
68	*Dendrocopos medius*	p	B	159	*Recurvirostra avosetta*	r, w	B

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
69	*Dendrocopos syriacus*	p	B	160	*Riparia riparia*	r	B
70	*Dryocopus martius*	r		161	*Saxicola rubetra*	c	B
71	*Egretta alba (Casmerodius albus albus)*	w	B	162	*Sterna (Gelochelidon) nilotica nilotica*	c, r	B
72	*Egretta garzetta garzetta*	c, r, w	B	163	*Sterna (Thalasseus) sandvicensis*	w	B
73	*Emberiza melanocephala*	r	B	164	*Sterna hirundo*	r	B
74	*Erithacus rubecula*	w	B	165	*Streptopelia turtur*	r	B
75	*Falco biarmicus*	w	B	166	*Sturnus vulgaris*	r, w	B
76	*Falco columbarius*	w	B	167	*Sylvia borin*	c	B
77	*Falco eleonorae*	c	B	168	*Sylvia cantillans*	r	B
78	*Falco peregrinus brookei*	c, w	B	169	*Sylvia curruca*	c	B
79	*Falco subbuteo*	r	B	170	*Tadorna ferruginea*	w	B
80	*Falco vespertinus*	c	B	171	*Tadorna tadorna*	r, w	B
81	*Ficedula albicollis*	c	B	172	*Tetrax tetrax tetrax*	w	
82	*Ficedula hypoleuca*	c	B	173	*Tringa erythropus*	c	B
83	*Ficedula parva*	c	B	174	*Tringa glareola*	c	B
84	*Ficedula semitorquata*	c	B	175	*Tringa nebularia*	w	B
85	*Fringilla coelebs*	r	B	176	*Tringa ochropus*	w	B
86	*Fulica atra atra*	r, w	B	177	*Tringa stagnatilis*	c	B
87	*Gallinago gallinago*	w	B	178	*Tringa totanus*	r, w	B
88	*Gavia arctica arctica*	w	B	179	*Turdus philomelos*	c	B
89	*Gavia stellata*	w		180	*Upupa epops*	r	B
90	*Glareola pratincola pratincola*	r	B	181	*Vanellus vanellus*	r, w	B
91	*Gyps fulvus*	c	B	182	*Xenus cinereus*	c	B

The site is also characterised by the occurrence of several other fauna species (species of National and/or Community interest), shown in Table 2-11, below.

Table 2-11. Fauna species per group (A: amphibians, F: fish, M: mammals, R: reptiles) in the Natura 2000 site GR1130010 (SPA) and their protection status [A: National Red Data List, B: Endemics, C: International Conventions (Bern, Bonn, Biodiversity etc.), D: Other Reasons, IV and V: respective annexes of the Habitats Directive].

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Bombina variegata*	A, C, D, IV	M	*Mustela nivalis*	A, C
A	*Bufo bufo*	A, C	M	*Nyctalus lasiopterus*	A, C, IV
A	*Bufo viridis*	A, C, IV	M	*Nyctalus leisleri*	A, C, IV
A	*Hyla arborea*	A, C, IV	M	*Vespertilio murinus*	A, C, IV
A	*Pelobates syriacus*	A, C, IV	M	*Vormela peregusna*	A, C, D, IV
A	*Rana dalmatina*	A, C, IV	R	*Coluber caspius*	A, C, IV
A	*Rana ridibunda*	A, C, V	R	*Coronella austriaca*	A, C, IV

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Salamandra salamandra*	A, C	R	*Cyrtopodion kotschyi*	A, C, IV
A	*Triturus karelinii*	A, C, D, IV	R	*Elaphe longissima*	A, C, IV
A	*Triturus vulgaris*	A, C	R	*Elaphe quatuorlineata*	A, C, D, IV
F	*Alosa fallax*	A, D, V	R	*Elaphe situla*	A, C, D, IV
F	*Alosa vistonica*	A, D, V	R	*Emys orbicularis*	A, C, D, IV
F	*Aphanius fasciatus*	A, C, D	R	*Lacerta trilineata*	A, C, IV
F	*Chalcalburnus chalcoides*	A, C, D	R	*Lacerta viridis*	A, C, IV
F	*Rhodeus amarus*	A, D	R	*Mauremys caspica*	A, D, IV
F	*Squalius cephalus*	A, D	R	*Natrix natrix*	A, C
F	*Syngnathus abaster*	A, C	R	*Natrix tessellata*	A, C, IV
I	*Lucanus cervus*	C, D	R	*Ophisaurus apodus*	A, C, IV
M	*Canis aureus*	A, V	R	*Podarcis taurica*	A, C, IV
M	*Felis silvestris*	A, C, IV	R	*Testudo graeca*	A, C, D, IV
M	*Lutra lutra*	A, C, D, IV	R	*Testudo hermanni*	A, C, D, IV
M	*Martes foina*	A, C	R	*Vipera ammodytes*	A, C, IV
M	*Meles meles*	A, C			

GR1130012 *"KOILADA KOMPSATOU".*

The area is particularly important for rare and endangered birds, such as the Syrian woodpecker (*Dendrocopos syriacus*), the Semi-collared flycatcher (*Ficedula semitorquata*) and the Ortolan bunting (*Emberiza hortulana*), which are reproducing in the area, as well as for breeding and passage raptors. All birds of Community interest within the site's area are shown in Table 2-12, below.

Table 2-12. Bird species of Community interest (Annex I, Birds Directive) in the Natura 2000 site GR1130012 (SPA), their type (p: permanent, r: reproducing, c: concentration, w: wintering) and degree of conservation (A: excellent, B: good, C: average or reduced).

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
1	*Accipiter brevipes*	r	A	24	*Ficedula semitorquata*	r	B
2	*Aegolius funereus*	p	A	25	*Gyps fulvus*	p	B
3	*Alauda arvensis*	r		26	*Haliaeetus albicilla*	p	B
4	*Alcedo atthis*	r	B	27	*Hieraaetus pennatus (Aquila pennata)*	r	B
5	*Anthus campestris*	r	A	28	*Hippolais olivetorum*	r	B
6	*Apus (Tachymarptis) melba*	r	B	29	*Hirundo rustica*	r	B
7	*Apus apus*	r		30	*Jynx torquilla*	r	
8	*Aquila chrysaetos*	p	B	31	*Lanius collurio*	r	B
9	*Aquila pomarina*	r	B	32	*Lanius minor*	r	B
10	*Bubo bubo*	p	A	33	*Lanius nubicus*	r	B
11	*Buteo buteo*	r		34	*Larus (Chroicocephalus) ridibundus*	w	
12	*Buteo rufinus*	p	B	35	*Lullula arborea*	p	A

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
13	*Caprimulgus europaeus*	r	A	36	*Merops apiaster*	c, r	B
14	*Ciconia nigra*	c, r	B	37	*Neophron percnopterus*	r	B
15	*Circaetus gallicus*	r	A	38	*Nycticorax nycticorax nycticorax*	c	B
16	*Coracias garrulus*	r	B	39	*Oriolus oriolus*	c	B
17	*Delichon urbicum (urbica)*	r	B	40	*Passer hispaniolensis*	r	B
18	*Dendrocopos medius*	p	B	41	*Pernis apivorus*	r	A
19	*Dendrocopos syriacus*	p	A	42	*Phalacrocorax pygmaeus*	w	B
20	*Emberiza hortulana*	r	B	43	*Picus canus*	p	B
21	*Falco columbarius*	w	B	44	*Streptopelia turtur*	r	B
22	*Falco naumanni*	r	B	45	*Sylvia nisoria*	r	B
23	*Falco peregrinus brookei*	p	A	46	*Tetrastes (Bonasia) bonasia*	p	B

GR1150001 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS KAI NISOS THASOPOULA"*.

Keramoti lagoons is an important site from ornithological point of view, as a site for breeding, passage and wintering waterbirds, raptors and passerines associated with reedbeds. Some heronries are also found here. All birds of Community interest within the site's area are shown in Table 2-13, below.

Table 2-13. Bird species of Community interest (Annex I, Birds Directive) in the Natura 2000 site GR1150001 (SPA), their type (p: permanent, r: reproducing, c: concentration, w: wintering) and degree of conservation (A: excellent, B: good, C: average or reduced).

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
1	*Accipiter brevipes*	r	B	89	*Haematopus ostralegus*	r, w	B
2	*Acrocephalus arundinaceus*	r	B	90	*Haliaeetus albicilla*	c, r	B
3	*Acrocephalus melanopogon*	c	B	91	*Hieraaetus fasciatus (Aquila fasciata)*	c	B
4	*Acrocephalus palustris*	c	B	92	*Hieraaetus pennatus (Aquila pennata)*	c	B
5	*Acrocephalus schoenobaenus*	r	B	93	*Himantopus himantopus*	r	B
6	*Acrocephalus scirpaceus*	r	B	94	*Hippolais icterina*	c	B
7	*Actitis hypoleucos*	c	B	95	*Hirundo daurica*	r	B
8	*Alauda arvensis*	r, w	B	96	*Hirundo rustica*	r	B
9	*Alcedo atthis*	r, w	B	97	*Ixobrychus minutus minutus*	r	B
10	*Anas acuta*	w	B	98	*Jynx torquilla*	c	B
11	*Anas clypeata*	w	B	99	*Lanius collurio*	r	B
12	*Anas crecca crecca*	w	B	100	*Lanius minor*	r	B
13	*Anas penelope*	w	B	101	*Lanius senator*	r	B
14	*Anas platyrhynchos platyrhynchos*	r, w	B	102	*Larus (Chroicocephalus) ridibundus*	w	B
15	*Anas querquedula*	c, r	B	103	*Larus audouinii*	c	B

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
16	*Anas strepera strepera*	r, w	B	104	*Larus genei*	w	B
17	*Anser albifrons albifrons*	w	B	105	*Larus melanocephalus*	c, r	B
18	*Anser anser*	w	B	106	*Larus minutus*	c	B
19	*Anser erythropus*	w	B	107	*Locustella luscinioides*	r	B
20	*Anthus campestris*	r	B	108	*Lullula arborea*	w	B
21	*Anthus cervinus*	c	B	109	*Luscinia megarhynchos*	r	B
22	*Anthus pratensis*	c	B	110	*Melanocorypha calandra*	r	B
23	*Anthus spinoletta*	w	B	111	*Mergus serrator*	w	B
24	*Anthus trivialis*	w	B	112	*Merops apiaster*	r	B
25	*Apus (Tachymarptis) melba*	c	B	113	*Milvus migrans*	r, w	B
26	*Apus apus*	r	B	114	*Milvus milvus*	c	B
27	*Apus pallidus*	r	B	115	*Motacilla alba*	r	B
28	*Aquila chrysaetos*	r	B	116	*Motacilla cinerea*	w	B
29	*Aquila clanga*	w	B	117	*Motacilla flava*	r	B
30	*Aquila heliaca*	c	B	118	*Muscicapa striata*	c, r	B
31	*Aquila pomarina*	r	B	119	*Neophron percnopterus*	c	B
32	*Ardea cinerea cinerea*	r, w		120	*Numenius tenuirostris*	c	B
33	*Ardea purpurea purpurea*	r	B	121	*Nycticorax nycticorax nycticorax*	c	B
34	*Asio flammeus*	r, w	B	122	*Oenanthe hispanica*	r	B
35	*Asio otus*	r		123	*Oenanthe oenanthe*	r	B
36	*Aythya ferina*	w	B	124	*Oriolus oriolus*	r	B
37	*Aythya fuligula*	w	B	125	*Otus scops*	p, r	B
38	*Aythya nyroca*	r		126	*Pandion haliaetus*	c	B
39	*Botaurus stellaris stellaris*	r	B	127	*Passer hispaniolensis*	r	B
40	*Bubo bubo*	p, r	B	128	*Pelecanus crispus*	c, w	B
41	*Burhinus oedicnemus*	r	B	129	*Pelecanus onocrotalus*	c	B
42	*Buteo buteo*	r, w	B	130	*Pernis apivorus*	r	B
43	*Buteo rufinus*	c, r	B	131	*Phalacrocorax aristotelis desmarestii*	r, w	B
44	*Calandrella brachydactyla*	r	B	132	*Phalacrocorax carbo sinensis*	w	B
45	*Calidris alpina alpina*	c, w	B	133	*Phalacrocorax pygmaeus*	w	B
46	*Calidris ferruginea*	c	B	134	*Phalaropus lobatus*	c	B
47	*Calidris minuta*	w	B	135	*Phoenicopterus roseus*	w	B
48	*Calidris temminckii*	c	B	136	*Phoenicurus ochruros*	w	B
49	*Caprimulgus europaeus*	r	B	137	*Phoenicurus phoenicurus*	c	B
50	*Charadrius alexandrinus alexandrinus*	r, w	B	138	*Phylloscopus collybita*	w	B
51	*Charadrius hiaticula*	c	B	139	*Phylloscopus sibilatrix*	c	B
52	*Chlidonias hybrida*	w	B	140	*Phylloscopus trochilus*	c	B
53	*Chlidonias leucopterus*	c	B	141	*Picus canus*	p, r	B
54	*Chlidonias niger*	c	B	142	*Platalea leucorodia*	w	B

A/a	NAME	TYPE	CONSERVATION	A/a	NAME	TYPE	CONSERVATION
					leucorodia		
55	*Ciconia nigra*	r	B	143	*Plegadis falcinellus falcinellus*	c	B
56	*Circaetus gallicus*	r	B	144	*Pluvialis apricaria*	w	B
57	*Circus aeruginosus*	r, w	B	145	*Pluvialis squatarola*	w	B
58	*Circus cyaneus*	w	B	146	*Podiceps cristatus cristatus*	r, w	B
59	*Circus pygargus*	c	B	147	*Podiceps nigricollis nigricollis*	w	B
60	*Coracias garrulus*	r	B	148	*Porzana parva*	c	B
61	*Coturnix coturnix*	c, r	B	149	*Porzana pusilla intermedia*	c	B
62	*Cuculus canorus*	r	B	150	*Puffinus yelkouan*	w	B
63	*Cygnus olor*	r, w	B	151	*Recurvirostra avosetta*	w	B
64	*Delichon urbicum (urbica)*	r	B	152	*Riparia riparia*	r	B
65	*Dendrocopos medius*	p	B	153	*Saxicola rubetra*	c	B
66	*Dendrocopos syriacus*	r	B	154	*Sterna (Gelochelidon) nilotica nilotica*	r	B
67	*Dryocopus martius*	p, r	B	155	*Sterna (Hydroprogne) caspia caspia*	w	B
68	*Egretta alba (Casmerodius albus albus)*	w	B	156	*Sterna (Thalasseus) sandvicensis*	w	B
69	*Egretta garzetta garzetta*	c, r, w	B	157	*Sterna hirundo*	r	B
70	*Emberiza caesia*	c	B	158	*Streptopelia turtur*	r	B
71	*Emberiza melanocephala*	r	B	159	*Sturnus vulgaris*	r, w	B
72	*Erithacus rubecula*	w	B	160	*Sylvia borin*	c	B
73	*Falco biarmicus*	w	B	161	*Sylvia cantillans*	r	B
74	*Falco columbarius*	w	B	162	*Sylvia communis*	r	B
75	*Falco eleonorae*	c	B	163	*Sylvia curruca*	c	B
76	*Falco peregrinus brookei*	w	B	164	*Tadorna ferruginea*	w	B
77	*Falco subbuteo*	r	B	165	*Tadorna tadorna*	r, w	B
78	*Falco vespertinus*	c	B	166	*Tringa glareola*	c	B
79	*Ficedula albicollis*	c	B	167	*Tringa nebularia*	w	B
80	*Ficedula hypoleuca*	c	B	168	*Tringa ochropus*	w	B
81	*Ficedula semitorquata*	c	B	169	*Tringa stagnatilis*	c	B
82	*Fringilla coelebs*	r	B	170	*Tringa totanus*	r, w	B
83	*Fulica atra atra*	r, w	B	171	*Turdus philomelos*	c	B
84	*Gallinago gallinago*	w	B	172	*Upupa epops*	r	B
85	*Gavia arctica arctica*	w	B	173	*Vanellus (Hoplopterus) spinosus*	r	
86	*Gavia stellata*	w		174	*Vanellus vanellus*	r, w	B
87	*Glareola pratincola pratincola*	r	B	175	*Xenus cinereus*	c	B
88	*Gyps fulvus*	c	B				

The wider part of the river mouth is important spawning and nursery ground for several commercially, intensively used species (Seabream, Seabass, Mullet, Eel etc.). The site is also characterised by the occurence the invertebrates (Ledipoptera) *Maculinea alcon* and *Lycaeides argyrognomon*. Several other fauna species (species of National and/or Community interest), shown in Table 2-14, below, find habitat in the area.

Table 2-14. Fauna species per group (A: amphibians, F: fish, I: invertebrates, M: mammals, R: reptiles) in the Natura 2000 site GR1150001 (SPA) and their protection status [A: National Red Data List, B: Endemics, C: International Conventions (Bern, Bonn, Biodiversity etc.), D: Other Reasons, IV and V: respective annexes of the Habitats Directive].

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Bombina variegata*	A, C, D, IV	M	*Canis aureus*	A, V
A	*Bufo bufo*	A, C	M	*Canis lupus*	A, C, V
A	*Bufo viridis*	A, C, IV	M	*Felis silvestris*	A, C, IV
A	*Hyla arborea*	A, C, IV	M	*Lutra lutra*	A, C, D, IV
A	*Pelobates syriacus*	A, C, IV	M	*Martes foina*	A, C
A	*Rana dalmatina*	A, C, IV	M	*Meles meles*	A, C
A	*Rana graeca*	A, C, IV	M	*Pipistrellus nathusii*	A, C, IV
A	*Rana ridibunda*	A, C, V	M	*Sus scrofa*	A, C
A	*Salamandra salamandra*	A, C	R	*Caretta caretta*	A, C, D, IV
A	*Triturus karelinii*	A, C, D, IV	R	*Coluber caspius*	A, C, IV
A	*Triturus vulgaris*	A, C	R	*Coronella austriaca*	A, C, IV
F	*Alosa fallax*	A, D, V	R	*Cyrtopodion kotschyi*	A, C, IV
F	*Aphanius fasciatus*	A, C, D	R	*Elaphe longissima*	A, C, IV
F	*Barbus strumicae*	A, D, V	R	*Elaphe quatuorlineata*	A, C, D, IV
F	*Chondrostoma vardarense*	A, B	R	*Elaphe situla*	A, C, D, IV
F	*Cobitis strumicae*	A, D	R	*Emys orbicularis*	A, C, D, IV
F	*Oxynoemacheilus bureschi*	A, B	R	*Hemidactylus turcicus*	A, C
F	*Pomatoschistus marmoratus*	A, D	R	*Lacerta viridis*	A, C, IV
F	*Rhodeus amarus*	A, D	R	*Mauremys caspica*	A, D, IV
F	*Squalius cephalus*	A, D	R	*Natrix tessellata*	A, C, IV
F	*Squalius orpheus*	A, B	R	*Ophisaurus apodus*	A, C, IV
F	*Syngnathus abaster*	A, C	R	*Podarcis taurica*	A, C, IV
I	*Lycaeides argyrognomon*	D	R	*Testudo graeca*	A, C, D, IV
I	*Lycaena dispar*	A, C, D, IV	R	*Testudo hermanni*	A, C, D, IV
I	*Maculinea alcon*	D	R	*Vipera ammodytes*	A, C, IV
I	*Ophiogomphus cecilia*	C, D, IV			

GR1130006 *"POTAMOS FILIOURIS".*

The site provides habitat to rare and important fauna species, including the endemic fish Vistonis shemaja (*Alburnus vistonicus*). Equally important is the presence of five species of reptiles and one amphibian, all species included in Annex II of the Habitats Directive (Table 2-15).

Table 2-15. Fauna species of Community interest (Annex II, Habitats Directive) in the Natura 2000 site GR1130006 (SAC), per group (A: amphibians, F: fish, I: invertebrates, M: mammals, R: reptiles) and their degree of conservation (A: excellent, B: good, C: average or reduced).

GROUP	NAME	CONSERVATION
A	*Triturus karelinii*	B
F	*Alburnus vistonicus*	B
F	*Barbus cyclolepis*	A
F	*Cobitis strumicae*	A
F	*Rhodeus amarus*	A
M	*Lutra lutra*	B
M	*Vormela peregusna*	
R	*Elaphe sauromates*	B
R	*Emys orbicularis*	B
R	*Mauremys rivulata*	B
R	*Testudo graeca*	B
R	*Testudo hermanni*	B

Eight reptiles, four amphibian and five mammal species (Table 2-16) have also been recoeded. The site is rich in birds of prey, e.g *Neophron percnopterus*, *Gyps fulvus*, *Aquila pomarina*, *A. chrysaetos* etc. Moreover, it is the most important feeding area for vultures. Additional breeding species include *Ciconia nigra*, *Dendrocopos medius* and *Hippolais olivetorum*.

Table 2-16. Fauna species per group (A: amphibians, F: fish, M: mammals, R: reptiles) in the Natura 2000 site GR1130006 (SAC) and their protection status [A: National Red Data List, B: Endemics, C: International Conventions (Bern, Bonn, Biodiversity etc.), D: Other Reasons, IV and V: respective annexes of the Habitats Directive].

GROUP	NAME	PROTECTION
A	*Bufo bufo*	A, C
A	*Bufo viridis*	A, C, IV
A	*Hyla arborea*	A, C, IV
A	*Rana ridibunda*	A, C, V
M	*Canis aureus*	A, V
M	*Canis lupus*	A, C, V
M	*Dryomys nitedula*	A, C, IV
M	*Felis silvestris*	A, C, IV
M	*Mustela putorius*	A, C, V
R	*Ablepharus kitaibelii*	A, C, IV
R	*Coluber caspius*	A, C, IV
R	*Coronella austriaca*	A, C, IV
R	*Lacerta trilineata*	A, C, IV
R	*Lacerta viridis*	A, C, IV

R	*Natrix tessellata*	A, C, IV
R	*Ophisaurus apodus*	A, C, IV
R	*Vipera ammodytes*	A, C, IV

GR1130009 *"LIMNES KAI LIMNOTHALASSES TIS THRAKIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI".* The site provides habitat to rare and important fauna species, including the endemic fish Vistonis shemaja (*Alburnus vistonicus*). Equally important is the presence of seven species of reptiles and two amphibians, eight fish species, two invertebrates and six mammals, all included in Annex II of the Habitats Directive (Table 2-17).

Table 2-17. Fauna species of Community interest (Annex II, Habitats Directive) in the Natura 2000 site GR1130009 (SAC), per group (A: amphibians, F: fish, I: invertebrates, M: mammals, R: reptiles) and their degree of conservation (A: excellent, B: good, C: average or reduced).

GROUP	NAME	CONSERVATION	GROUP	NAME	CONSERVATION
A	*Bombina variegata*	C	M	*Lutra lutra*	
A	*Triturus karelinii*	B	M	*Lutra lutra*	C
F	*Alburnus vistonicus*	C	M	*Miniopterus schreibersii*	B
F	*Alosa fallax*	C	M	*Rhinolophus blasii*	C
F	*Alosa vistonica*	C	M	*Rhinolophus ferrumequinum*	C
F	*Aphanius fasciatus*	C	M	*Vormela peregusna*	
F	*Barbus cyclolepis*	B	R	*Caretta caretta*	
F	*Chalcalburnus chalcoides*	C	R	*Elaphe quatuorlineata*	C
F	*Cobitis strumicae*	A	R	*Elaphe situla*	
F	*Rhodeus amarus*	B	R	*Emys orbicularis*	C
F	*Rhodeus sericeus amarus*	B	R	*Mauremys rivulata*	C
I	*Lindenia tetraphylla*	B	R	*Testudo graeca*	C
I	*Lucanus cervus*	C	R	*Testudo hermanni*	C

Some 47 important amphibians, fish, invertebrats, mammals and reptiles (Table 2-18). Several bird species also have their national strong holds here. The total Greek and European populations of others, breed in those wetlands, protected under the Ramsar Convention.

Table 2-18. Fauna species per group (A: amphibians, F: fish, M: mammals, R: reptiles) in the Natura 2000 site GR1130006 (SAC) and their protection status [A: National Red Data List, B: Endemics, C: International Conventions (Bern, Bonn, Biodiversity etc.), D: Other Reasons, IV and V: respective annexes of the Habitats Directive].

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Pelobates syriacus*	A, C, IV	M	*Nyctalus leisleri*	A, C, IV
A	*Rana dalmatina*	A, C, IV	M	*Nyctalus noctula*	A, C, IV
A	*Rana ridibunda*	A, C, V	M	*Pipistrellus kuhlii*	A, C, IV

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Salamandra salamandra*	A, C	M	*Pipistrellus nathusii*	A, C, IV
A	*Triturus vulgaris*	A, C	M	*Pipistrellus pipistrellus*	A, C, IV
A	*Bufo bufo*	A, C	M	*Tadarida teniotis*	A, C, IV
A	*Bufo viridis*	A, C, IV	M	*Vespertilio murinus*	A, C, IV
A	*Hyla arborea*	A, C, IV	M	*Canis aureus*	A, V
F	*Oxynoemacheilus bureschi*	A, B	M	*Canis lupus*	A, C, V
F	*Pomatoschistus marmoratus*	A, D	M	*Dryomys nitedula*	A, C, IV
F	*Squalius cephalus*	A, D	M	*Eptesicus serotinus*	A, C, IV
F	*Squalius orpheus*	A, B	M	*Felis silvestris*	A, C, IV
F	*Syngnathus abaster*	A, C	M	*Hypsugo savii*	A, C, IV
I	*Lycaena thersamon*	D	R	*Natrix natrix*	A, C
I	*Pararge aegeria*	D	R	*Natrix tessellata*	A, C, IV
I	*Anax imperator*	D	R	*Ophisaurus apodus*	A, C, IV
M	*Martes foina*	A, C	R	*Podarcis taurica*	A, C, IV
M	*Meles meles*	A, C	R	*Vipera ammodytes*	A, C, IV
M	*Micromys minutus*	A	R	*Coluber caspius*	A, C, IV
M	*Mustela nivalis*	A, C	R	*Cyrtopodion kotschyi*	A, C, IV
M	*Myotis aurascens*	A, C, IV	R	*Elaphe longissima*	A, C, IV
M	*Neomys anomalus*	A, C	R	*Lacerta viridis*	A, C, IV
M	*Nyctalus lasiopterus*	A, C, IV			

GR1150010 *"DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS - EVRYTERI PERIOCHI KAI PARAKTIA ZONI"*

The site provides habitat to rare and important fauna species, including the sea turtle (*Caretta caretta*). Equally important is the presence of the other six species of reptiles and two amphibians, six fish species, three invertebrates and five mammals, all included in Annex II of the Habitats Directive (Table 2-19).

Table 2-19. Fauna species of Community interest (Annex II, Habitats Directive) in the Natura 2000 site GR1150010 (SAC), per group (A: amphibians, F: fish, I: invertebrates, M: mammals, R: reptiles) and their degree of conservation (A: excellent, B: good, C: average or reduced).

GROUP	NAME	CONSERVATION
A	*Bombina variegata*	
A	*Triturus karelinii*	
F	*Alosa fallax*	C
F	*Aphanius fasciatus*	B
F	*Barbus strumicae*	B

F	*Cobitis strumicae*	B
F	*Rhodeus amarus*	B
F	*Rhodeus sericeus amarus*	B
I	*Lindenia tetraphylla*	B
I	*Lycaena dispar*	B
I	*Ophiogomphus cecilia*	B
M	*Lutra lutra*	C
M	*Miniopterus schreibersii*	B
M	*Phocoena phocoena*	
M	*Rhinolophus ferrumequinum*	C
M	*Tursiops truncatus*	
R	*Caretta caretta*	
R	*Elaphe quatuorlineata*	C
R	*Elaphe situla*	
R	*Emys orbicularis*	C
R	*Mauremys rivulata*	C
R	*Testudo graeca*	C
R	*Testudo hermanni*	C

From an ichtyological point of view, the site is important spawning and nursery ground for several commercially, intensively used species (Seabream, Seabass, Mullet, Eel etc.). Also, some very important fauna species find habitat here (Table 2-20). In total 53 important amphibians, fish, invertebrats, mammals and reptiles are distributed within the site's area. Finnaly, Keramoti lagoons are an important site from an ornithological point of view, as it is used by breeding, passage and wintering waterbirds, raptors and passerines associated with reedbeds.

Table 2-20. Fauna species per group (A: amphibians, F: fish, M: mammals, R: reptiles) in the Natura 2000 site GR1150010 (SAC) and their protection status [A: National Red Data List, B: Endemics, C: International Conventions (Bern, Bonn, Biodiversity etc.), D: Other Reasons, IV and V: respective annexes of the Habitats Directive].

GROUP	NAME	PROTECTION	GROUP	NAME	PROTECTION
A	*Bufo bufo*	A, C	M	*Felis silvestris*	A, C, IV
A	*Bufo viridis*	A, C, IV	M	*Felis silvestris*	A, C, IV
A	*Hyla arborea*	A, C, IV	M	*Martes foina*	A, C
A	*Pelobates syriacus*	A, C, IV	M	*Meles meles*	A, C
A	*Rana dalmatina*	A, C, IV	M	*Micromys minutus*	A
A	*Rana graeca*	A, C, IV	M	*Myotis aurascens*	A, C, IV
A	*Rana ridibunda*	A, C, V	M	*Neomys anomalus*	A, C
A	*Salamandra salamandra*	A, C	M	*Nyctalus leisleri*	A, C, IV
A	*Triturus vulgaris*	A, C	M	*Nyctalus noctula*	A, C, IV
F	*Chondrostoma vardarense*	A, B	M	*pipistrellus kuhlii*	A, C, IV

F	*Oxynoemacheilus bureschi*	A, B	M	*Pipistrellus nathusii*	A, C, IV
F	*Pomatoschistus marmoratus*	A, D	M	*Pipistrellus pipistrellus*	A, C, IV
F	*Squalius cephalus*	A, D	M	*Sus scrofa*	A, C
F	*Squalius orpheus*	A, B	M	*Tadarida teniotis*	A, C, IV
F	*Syngnathus abaster*	A, C	R	*Coluber caspius*	A, C, IV
I	*Aeshna isoscels*	D	R	*Coronella austriaca*	A, C, IV
I	*Anax imperator*	D	R	*Cyrtopodion kotschyi*	A, C, IV
I	*Apatura ilia*	D	R	*Elaphe longissima*	A, C, IV
I	*Lycaeides argyrognomon*	D	R	*Lacerta viridis*	A, C, IV
I	*Maculinea alcon*	D	R	*Lacerta viridis*	C
I	*Orthetrum taeniolatum*	D	R	*Lacerta viridis*	IV
I	*Pararge aegeria*	D	R	*Natrix natrix*	A, C
I	*Pontia daplidice*	D	R	*Natrix tessellata*	A, C, IV
M	*Canis aureus*	A, V	R	*Ophisaurus apodus*	A, C, IV
M	*Canis lupus*	A, C, V	R	*Podarcis taurica*	A, C, IV
M	*Delphinus delphis*	A, C, IV	R	*Vipera ammodytes*	A, C, IV
M	*Dryomys nitedula*	A, C, IV			

2.1.4 Other natural characteristics

The National Park of Eastern Macedonia and Thrace comprises an extensive complex of coastal wetlands e.g. from Nea Karvali lagoons, Nestos delta, Lakes Vistonida and Ismarida and the surrounding lagoons till Lissos River. The most important features of this coastal wetland complex are summarized as following:

Nestos river is one of the five largest rivers in Greece and consists the natural boundary between Macedonia and Thrace, as well as between the prefectures of Kavala and Xanthi. The river springs from Rila mountain in Bulgaria and, after 234 km, flows into the Thracian Sea (Fig. 2-4). Along its flowing course of 130 km on the Greek terrain, the river collects the waters of many streams, forming a complex hydrographic network and creating an environment of particular ecological interest, of high value and unique beauty.

The section of the river between the Toxotes Bridge and the Thracian Sea (29 km long) forms a delta of a total area of ~55,000 ha which extends from Nea Karvali to Avdira. The delta formation was influenced by both the river flow and sea waves. Thus, the western part of the delta was formed by the action of the various riverbeds of Nestos river, while the lagoons along the coast were formed due to the natural separating arm formed by the continuous deposition of debris. The eastern part consists mainly of sedimentary material. In fact, the whole area up to Lake Vistonida constitutes a unified system created by the combined action of several rivers (Nestos, Kosinthos, Kompsatos, Xiropotamos, Filiouris etc.) and even more streams that flow from Mount Rhodope into the Thracian Sea.

Today's image is mainly the result of human intervention and anthropogenic activities. The riverbed was aligned and delineated in early 1950s to prevent flooding of the wider area. Thesaurus and Platanovrysis dams, which started their operation in year 1997, are used for electricity production purposes. At the top of the delta, Toxotes, another dam, was built in 1966 for irrigation purposes. The large riparian Nestos forest was logged, confined to a narrow lane on either side of the riverbed, and the area was attributed to agriculture.

Figure 2-4. Nestos river, near the delta. Photo archive EKBY / L. Logothetis.

Keramoti lagoons refers to eight large and small lagoons that are included in the wetland complex of Nestos Delta. The lagoons of Vassova, Eratinou, Agiasmatos, Kokkalas, Haideftou, Keramotis and Monastirakiou to the west of the river and Erasmus lagoon east of the river. The lagoons were formed by the deposition of sediment mainly due to the sudden decrease of the river water flow in its point of contact with the sea. Thus, islets parallel to the coast were formed, which in combination with the continuous deposition of sediment, formed the lagoons. These lagoons occupy a total of 1,750 ha and are among the most productive natural fish farms of the country.

Chrysoupoli lakes refers to seven small lakes formed northeast of Chrysoupoli. There are two theories referring to their formation. One says that these lakes were once lagoons when Nestos estuary was located to the north, before the present delta was formed. With the deposition of the sediment of the river these lagoons were confined. Then, the influx of freshwater (surface and underground) and the removal of the sea, led to the formation of the present lakes. The second theory calls for old riverbeds, which were cut off by Nestos river due to natural mechanisms.

Lake Vistonida and surrounding lagoons occupy a total area of 4,500 ha. Lake Vistonida (Fig. 2-5) is actually an extension of Porto Lagos, separated from the sea by a narrow land lane and its depth is ranging from 2 to 3.5 m, and is. South of the lake lies the Porto Lagos lagoon, which is connected to the sea through a natural channel and has three openings / mouths to the lake. The wetland complex is complemented by the lagoons west of Lake Vistonida (Lafri and Lafrouda are the largest ones), which functionally connect the area with the Nestos delta. Lake Vistonida is characterized by a unique phenomenon in Greece; its northern part is filled with freshwater, as it receives input mainly from Kosynthos, Kompsatos and Travos rivers, while its southern part receives seawater from the three mouths connecting it to the Porto Lagos lagoon and is thus brackish, with salinity levels varying depending on the movement of water bodies between the lake and the lagoon. Today, the lake supports the local economy, as many fish species are find habitat in its waters, while its ecological importance renders it a pole of attraction for visitors.

Figure 2-5. Lake Vistonida. Photo archive EKBY / M. Papadopoulos-STEREOSIS.

Lake Ismarida and Rhodope lagoons are located in Thrace, in the southern part of the Rhodope prefecture, approximately 20 km from the city of Komotini and 5 km from the sea (Anoiktos gulf), in the eastern part of NP-EMATH. Ismarida, a small and shallow lake, is the only freshwater lake in Thrace. Its surface area is about 3.2 km^2 and its depth 1.5 m (Fig. 2-6). At the south part, the lake is connected to the Thracian Sea through a 5.2 km long channel. Lake Ismarida constitutes a valuable asset for the rural population of the wider area, as it is used for irrigation and fishery. The Ismarida catchment area and the Vosvozis (or Asprorema) river occupy an area of approximately 37,000 ha and are, for the most part, lowland. The lake is surrounded by extensive reeds, rich floating vegetation covers a large part of its surface, while salt and freshwater marshes cover its eastern and

southern sides. Vosvozis river forms a small delta at the point of entry into the lake (at the north side) surrounded by a small riparian forest and extensive reeds. On the east side, Lissos (Filiouris) river constitutes the natural border of NP-EMATH. Lissos flows from eastern Mount Rhodope into Anoiktou gulf, after 74 km. In the past years, Lake Ismarida and Filiouris river were connected in the south. The connection was interrupted by the construction of the eastern embankment of the lake, two decades ago. Xerolimni (Fanari), Arogi (Karatza), Aliki (Mesi), Ptelea and Elos lagoons cover an area of 14 km^2 west of the lake.

Figure 2-6. Lake Ismarida. Photo archive EKBY / M. Papadopoulos-STEREOSIS.

2.2 Anthropogenic Activities within Study Area 1

2.2.1 Demographic characteristics

The Region of Eastern Macedonia and Thrace is the eastern point of Greece that has been transformed geographically from a "border area" into a crossroad and a "gate" to the country and to the European Union ".

Since 2007 with the accession of Bulgaria and Romania to the European Union, the Region of Eastern Macedonia and Thrace is an open space for commercial and social activities that connect, the northern part of Greece and the rest of the Balkan countries. According to Kallikratis Programme Law

3852 / 2010[2], the Region of Eastern Macedonia and Thrace consists of the Regional Units of Evros, Drama, Kavala, Xanthi and Rodopi as shown in Figure 2-7.

The Region occupies 10.7% of the total land area of the country with permanent population 608.182 residents (EL.STAT., 2011), which constitute 5.6% of the total population of Greece.

Figure 2-7: Map of Eastern Macedonia and Thrace

The main characteristic of the Region is its population structure, with 66.8% being concentrated in the seven (7) largest population centers (Orestiada, Didymoteicho, Alexandroupoli, Komotini, Xanthi, Drama, Kavala), which are (almost) equally distributed in its geographical territory (Figure 2-8). The two islands, Thassos with 13,770 residents and Samothraki with 2,859 residents, complete the population of the Region.

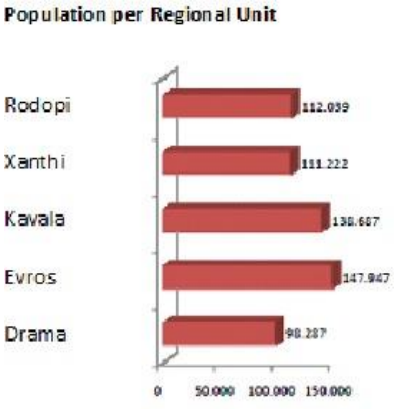


Figure 2-8: Population of the Region

2 http://www.ypes.gr/UserFiles/f0ff9297-f516-40ff-a70e-eca84e2ec9b9/nomos_kallikrati_9_6_2010.pdf

The Regional Unit of Evros has the highest population of the Region of Eastern Macedonia and Thrace (24.33% of the total population) with 147.947 residents, of which 72,959 residents located in the Municipality of Alexandroupoli, 37,695 residents located in the Municipality of Orestiada, 19,493 residents located in the Municipality of Didymoteicho, 14,941 residents located in the Municipality of Soufli and 2,859 located residents in the island of Samothraki. Second in population is the Regional Unit of Kavala (22.80%) with 138.687 residents.

The Municipality of Kavala, is the most important economic area and a center of development for the region having 70.501 residents. The Municipality of Thassos, which is the most important tourist resort of northern Greece and of the Region of Eastern Macedonia and Thrace has 13,770 residents. The Regional Unit of Rodopi has a population of 112,039 residents (18.42%), and the Municipality of Komotini 66,919 residents.

The Regional Unit of Xanthi gathers 18.29% of the total population of the Region (111.222 residents) and is characterized by the large urban Municipality of Xanthi (65.133 residents). The Regional Unit of Drama, which is an important winter tourist resort in Northern Greece, is the smallest regional unit with population size (16.16%) of 98.287 residents.

The Region's economy, regardless the gradual trend - desire for tertiarisation remains strongly agricultural with significant activities in the secondary sector (processing and industry). The favorable business conditions that were provided by the neighboring countries such as Bulgaria and Romania, caused the relocation of industrial units to neighboring areas with lower operating costs and greater output.

This fact has led to the deregulation of the local economic activity and labour market causing negative effects on employment, and the loss of revenue for the state. Regarding the distribution of the regional GDP in relation to the national GDP, this represents 3.9% of the total GDP for 2012 placing Eastern Macedonia and Thrace in the 8th position, according to its contribution to the national GDP.

The participation of the Regional Units to the regional GDP is unequal since the Regional Unit of Drama has the lowest participation (957 million euros) and the Regional Unit of Evros the higher participation (1,752 million euros) in GDP.

2.2.2 Energy analysis

The Electricity consumption by use (household, commercial, industrial, agricultural, public and municipal authorities and street lighting) is presented in Table 2-21. The calculations are based on PPC data for the Region of Eastern Macedonia and Thrace.

Table 2-21: Electricity Consumption in MWh by use per Regional Unit

Use	**Regional**				
	Kavala	Xanthi	Rodopi	Evros	Drama
Domestic	221.304	143.359	136.135	199.360	143.789
Industrial	160.200	122.926	135.089	81.535	44.148
Commercial	176.608	103.116	96.131	133.417	99.067
Agricultural	44.106	39.357	60.417	39.722	53.005
Public and Municipal Authorities	23.687	21.399	22.707	53.889	9.413
Street Lighting	12.509	8.320	4.257	10.605	9.170
Total	**638.415**	**438.476**	**454.735**	**518.528**	**358.592**

Within the boundaries of the Eastern Macedonia and Thrace there is significant power generation through photovoltaic systems that are basically installed on fields and home roofs. The total installed power has been calculated at 27.58 MW (in operation). The total agricultural area covered by photovoltaic systems was estimated at about 501 acres. The houses on the roofs of which photovoltaic power generation systems are installed amount to 261.

According to the Hellenic Statistical Authority (ELSTAT), data on Petroleum Consumption for Greece rgarding the year 2017 show that there is a decrease in the consumption of petroleum products in 2017. Specifically, in 2017 compared to 2016, consumption decreased by 1.2%, from 7,272,582 tons to 7,186,497 tons.

The decrease in consumption of petroleum products in the year 2017 was mainly due to a decrease of 61.4% in the consumption of petrol, 3.5% in unleaded petrol and 2.3% in heating oil. At the same time, in 2017 compared to the year 2016, there was an increase in the following categories of petroleum products: gasoline unleaded 98/100 (5.6%), liquefied petroleum gas (1.7%) and diesel fuel (0.1%). Consumption of low sulfur and heavy sulfur fuel oil for the year 2017 amounted respectively to 371,730 and 155,166 tons.

For the Region of Eastern Macedonia and Thrace the consumption of Petroleum products per Regional Unit is presented in Table 2-22.

Table 2-22: Petroleum products consumption in the Eastern Macedonia and Thrace

		Petrol			Diesel		Fuel oil		(LPG)
		Super (LRP)	Unleaded (95 RON)	Unleaded (98/100 RON)	Heating	Fuel (BIO)	Low Sulfur	High Sulfur	
Eastern Macedonia and Thrace	**Total of the Region**	**0**	**93,924**	**2,782**	**95,263**	**190,323**	**7,970**	**290**	**25,239**
	Evros		20,997	736	27,443	53,108	5,581	75	5,800
	Xanthi		16,262	598	11,506	23,183	588	21	4,956
	Rodopi		14,034	437	13,344	32,725	832		3,878
	Drama		15,706	327	18,343	30,291	211	147	4,797
	Kavala		26,926	684	24,627	51,016	758	47	5,807

2.2.3 Transport activity

The transport infrastructures constitute the accessibility conditions and hence the popularity of a destination and contribute to its economic growth and development, while it facilitates the frequent and economic movement of people, goods and services. The upgraded transport infrastructures favor the design of developmental activities, such as tourism and contribute to the improvement of quality of life.

The Region of Eastern Macedonia and Thrace required modern and large-scale transport infrastructures mainly due to its geographic location and geomorphology. The fact that it is a border of the European Union and an international hub in Southeastern Europe, has been of great importance since the most important energy, commercial, industrial and tourist activities take place in the Region.

Its geographical location between three urban centers in the Balkans (Thessaloniki, Sofia, Istanbul) is of strategic importance and favors a number of developmental parameters. The transport

infrastructures of the Region of Eastern Macedonia and Thrace consist of road and railway networks, airports and ports.

Road Network

The Egnatia Motorway is one of the most important infrastructure projects in Greece, in the Balkans but also critical to Europe as a whole, as it crosses horizontally the regions of Eastern Macedonia and Thrace, Central and Western Macedonia and Epirus. It is a project of great importance since it is the largest motorway (A2) in Greece (670 km) that starts from Igoumenitsa and ends to Kipous in Evros. and it is part of the European Route E90 (6,441 km), which starts from Portugal, crosses Spain, Italy, Greece and ends to Turkey.

Egnatia Motorway contributes to the economic development of northern Greece and to the improvement of the accessibility to the urban centers and the countryside of Eastern Macedonia and Thrace. The last one is an important fact as it sets the Region of Eastern Macedonia and Thrace as a nearby tourist destination from the second largest airport of the country, Thessaloniki.

The Egnatia Motorway in the Region of Eastern Macedonia and Thrace starts from the Strymona River to Kipous in Evros, and crosses the protected area of Nestos Park in the section from Chrysoupoli to Vaniano (about 17 km). Egnatia Motorway is connected with vertical axis, some of which are within the boundaries of the Region of Eastern Macedonia and Thrace:

●Alexandroupoli – Ardanio – Ormenio (135km)
●Kavala – Drama – Exohi (80km)
●Serres – Drama - Kavala
●Komotini – Nimfaia – Greek-Bulgarian borders (24km)
●Xanthi – Ehinos - Greek-Bulgarian borders (48km)

The national road network at the boundaries of the Region of Eastern Macedonia and Thrace Region:

●The National Road 2 connects eastern Greece with western Greece, starts from Kristalopigi, on the borders with Albania, crosses the city of Thessaloniki and the Region of Eastern Macedonia and Thrace via Kavala and Alexandroupoli, ending to Evros Bridge. The coastal areas of all the Regional Units, the airports and the most important ports of the Region are connected to this road.
●The National Road 12 crosses the Region of Central Macedonia (Thessaloniki, Serres, Mesorahi) and ends in Eastern Macedonia (Drama, Kavala).
●The National Road 14 crosses the Region of Eastern Macedonia and Thrace via Drama, Paranesti, Stavroupoli and Xanthi
●The National Road 51 is the north-south axis from Alexandroupoli, Ardanio, Didymoteicho, Orestiada, Kastanies and continues through the provincial road of Kastania Ormenio, the three-node of Greece, Bulgaria, Turkey at the borders. This road axis ensures the interconnection of the Region

of Eastern Macedonia and Thrace with Turkey via Kipous in Evros, Central Bulgaria via Ormenio and the Black Sea areas through Kastanies.

●The National Road 53 starts from Alexandroupoli, crosses Aisimi and Dereio and ends to Greek – Bulgarian borders.

●The National Road 55 starts from Xanthi, crosses Ehinio and ends to Greek – Bulgarian borders

●The National Road 57 starts from Drama, crosses K.Neurokopi and ends to Greek – Bulgarian borders.

●The National Road 69 is the national road of Thassos that interconnects the port facilities of the island.

Railway Network

The Region of Eastern Macedonia and Thrace is served by the railway network of the line Thessaloniki-Ormenio which passes through four Regional Units of Eastern Macedonia and Thrace, except from Kavala. The total network of approximately 410 km is part of the line Thessaloniki-Alexandroupoli that connects the Region of Eastern Macedonia and Thrace with Bulgaria, and extends from the frontier station of Ormenio to the borders with Turkey.

Airports

The International Airport "Demokritos" is located in the Regional Unit of Evros, 7km eastern of Alexandroupoli, on the National Road 90 that connects Greece with Turkey. The airport has an average capacity regarding the flights and passenger traffic and has played an important role in the tourism development of the region over the last twenty years. Airport infrastructures are considered adequate and valuable, but they need to be upgraded so as to become an international hub.

The airport "Megas Alexandros" which is located in Kavala, serves both domestic and international flights. External charter flights are increasing dynamically over the last few years due to the fact that Thassos as well as the wider area of Kavala has become a very popular tourist destination.

Despite the dynamic and qualitative characteristics of these two airports, the lack of modern infrastructures and proper coordination with strategic orientation on tourism and local economic development still remain a key issue. However, according to Eurostat[3] air passengers are increasing in the Region of Eastern Macedonia and Thrace compared to other continental parts of Greece with a stronger tourist profile.

3 https://ec.europa.eu/eurostat/statistics-explained/index.php/Main_Page

Port Infrastructures

There are two (2) commercial and passenger ports of Kavala and Alexandroupoli which are located in the Region. Their passenger traffic is considered to be high and is characterised by the intense tourist traffic in the Regional Units of Kavala and Evros especially during the summer period.

The port contributes highly to the tourist development of Kavala and Thassos as it is reached by cruise ships and yachts. The commercial port "Philippos II" in Nea Karvali, which is directly connected to Egnatia Motorway, is included in the port infrastructures. On the eastern side of Kavala, the port of Keramoti is located, which is the closest point to Thassos, from where the main volume of passengers and cargo is transported to and from the island. The port of “Eleftheres” is located on the west side of Kavala at a distance of 17 km and serves mainly cargo handling and the fishing fleet.

Finally, in Kavala there are three (3) fishing shelters: in Kariani, in Nea Iraklitsa and Perigiali. Also the port located in Thassos is the most popular tourist destination of the Region of Eastern Macedonia and Thrace and the Regional Unit of Kavala. Another destination which serves those who want to visit southern Thassos is Skala Prinou.

In Samothraki, there is an important passenger port station (Kamariotissa) at a distance of 29 nautical miles from the port of Alexandroupoli and there is also the port of Therma.

In the Regional Unit of Xanthi there is the port of Porto Lagos, which is located close to Lake Vistonida, protected by the Ramsar Treaty. Porto Lagos is one of the most timeless, natural and important commercial, yacht and fishing ports of the Region. Also there is the small port of Avdira, in Xanthi that serves small fishing boats (amateur – professional boats), and yachts.

Although, the Regional Unit of Rodopi has access to the Aegean and Thracian Sea it does not have special port facilities like the other Regional Units. Its port infrastructures are related to the fishing shelters of Agios Charalambos Maroneia, Imeros and Fanari. Fanari is a seaside picturesque settlement that attracts tourists during summer.

2.2.4 Building stock

The building sector was recorded according to the Inventory of Buildings carried out by the Greek Statistical Service in the country in 2011.

The uses of the buildings are classified into nine (9) categories (Residences, Churches / Monasteries, Hotels, Factories / Workshops, School Buildings, Shops / Offices, Closed Parking - Parking, Hospitals / Clinics and Other Uses). The analysis of the buildings was carried out by municipal district and is presented in Table 2-23.

The category 'Other uses' mainly includes domestic poultry farms and warehouses.

Table 2-.23: Building stock by use per Regional Unit

Municipality	Total	Building Use								
		Residential	Church – Monastery	Hotels	Factory	Schools	Offices-Stores	Car Parking Spaces	Hospitals - Clinics	Other Use
Rodopi	57,738	39,037	267	36	287	376	2,446	46	29	15,214
Xanthi	57,050	44,109	299	179	459	247	3,076	277	24	8,380
Drama	44,678	30,008	375	26	360	260	1,498	257	16	8,385
Evros	71,904	45,589	416	162	322	333	2,263	145	33	6,036
Kavala	43,679	30,846	292	67	345	389	1,881	420	23	9,416

2.2.5 Tourist activity

The analysis of the tourist product supply is focused exclusively at the place of destination and includes all those elements, which directly or indirectly affect the visitor and relate to the opinion that tourists shape for each destination. The tourist offer is fitted to the demand through the creation of products that seek to satisfy as much as possible the visitor's preferences.

Given its heterogeneity, those are distinguished in two categories: the primary tourist offer and the secondary or resulting tourist offer.

In particular, primary supply consists of natural and man-made resources (natural resources, cultural resources, human activities, customs, events, etc.) and determines the attractiveness of a region and its ability to develop tourism.

Secondary tourist offer is a dynamic element of the tourist system, which activates tourism demand and is constantly adapted to its changes. It includes both equipment or facilities (communications and means of transport, telecommunications, retail, administrative services, health services, public safety, water supply, sewerage, waste collection, etc.) and on the other hand the tourist facilities accommodation, restaurants, leisure facilities (eg cultural facilities, nature-related facilities, etc.) as well as special tourist facilities such as e.g. ski resorts, climbing tracks, etc.

To summarize, a tourist offer is the quantity, quality and duration of the tourist products being available on the tourist market on specific prices and over a certain period of time.

Regarding accommodation availability In the Region of Eastern Macedonia and Thrace a total number of 11,131 beds operated in 2017 which is the 2,7% of the total bed number in Greece. More analytically Table 2-24. describes in numbers the Touristic Accommodation of the Region (Table 2.2-4).

Table 2-24: Number of beds in the Region

Regional Unit	***Total Number of Tourist Accommodation***			***Number of Beds***	***Number of Spaces***
	Hotels - Rooms	**Camping**	**Total**	**Hotels - Rooms**	**Camping**
Evros	62	2	64	3,810	321
Xanthi	19	2	21	1,379	211
Rodopi	22	2	24	1,636	236
Kavala	51	6	57	3,132	639
Drama	20	0	20	1,174	0
Total	**174**	**12**	**186**	**11,131**	**1,407**

The hotel's potential in the Region is not harmonically distributed. The higher number of available beds is recorded in the Regional Unit of Kavala (64%) and on the island of Thassos where the offer in beds reaches about 50%. The Regional Unit of Evros has 18% of beds available of the Region, of which most of them are in the Region of Evros (14.78%). In other Regional Units the percentage of hotel beds is low and does not exceed 7% of the total region. Figure 2.9 shows the density of available beds in the Region. The darkest the brown color the largest availability in beds.

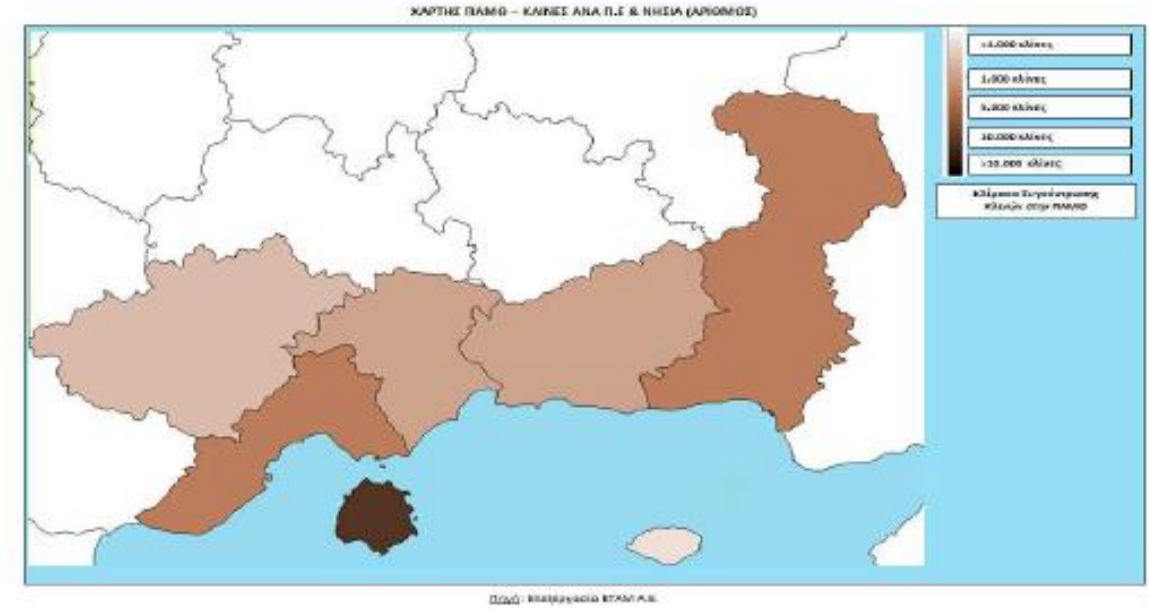


Figure 2.9: Density of Beds in the Region

Regarding the quality of hotel beds it is stated that the 5 star hotel beds account for almost 9% of the total Beds in the Region, with a significant relative deviation from the corresponding percentage of the country in a total of about 15% (2013).

As presented in Table 2-25, 2 star and 3 star beds are dominant.

Table 2-25: Percentage of hotel stars in the Region in relation with the Country total.

	5***	**4****	**3*****	**2****	**1***
2013					
Eastern Macedonia and Thrace	9,02	17,57	26,55	36,69	10,17
Country	15,20	25,08	23,75	28,95	7,01
2015					
Eastern Macedonia and Thrace	8,83	17,97	25,59	37,27	10,05

Besides the main hotel accommodation, there are others types of accommodation in the Region, such as rental apartments and rooms to let totaling 927 units. The quality of these lodgings which are classified with number of keys, while more than half of them (56%) have two keys and the available accommodations with one key is 28%. The percentage of accommodation with three keys is low (14%) while only 2% of the lodgings have four keys (Tables 2-26, 2-27, 2-28).

Table 2-26: Number of Apartments in the Region

Apartments					
Regional Unit	1 Key	2 Keys	3 Keys	4Keys	5Keys
Evros	0	3	2	1	6
Xanthi	0	1	0	0	1
Rodopi	0	1	0	0	1
Kavala	25	112	63	2	202
Drama	0	1	1	3	5
Total	25	118	66	6	215

Table 2-27: Number of Rooms in the Region

Rooms					
Regional Unit	1 Key	2 Keys	3 Keys	4Keys	5Keys
Evros	43	15	4	0	62
Xanthi	1	1	0	4	6
Rodopi	0	0	0	0	0

Kavala	179	328	37	6	550
Drama	0	1	1	3	5
Total	223	345	42	13	623

Table 2-28: Number of Apartments and Rooms in the Region

Apartments and Rooms					
Regional Unit	1 Key	2 Keys	3 Keys	4Keys	5Keys
Evros	3	0	0	0	3
Xanthi	0	0	0	0	0
Rodopi	0	1	0	0	1
Kavala	8	48	25	3	84
Drama	0	1	0	0	1
Total	11	50	25	3	89

Another category of tourist accommodation is the traditional guesthouses and agrotourism hostel units that have already been counted in the total number of beds in the Region as presented in Table 2-29 .

Table 2-29: Traditional guesthouses and agrotourism hostel units in the Region.

Regional Unit	**Number of Units**
Evros	9
Xanthi	2
Drama	2
Kavala	1
Rodopi	1

Finally in the Region of Eastern Macedonia and Thrace there are 15 Camping sites operating. The map below shows the geographical distribution (Figure 2-10)

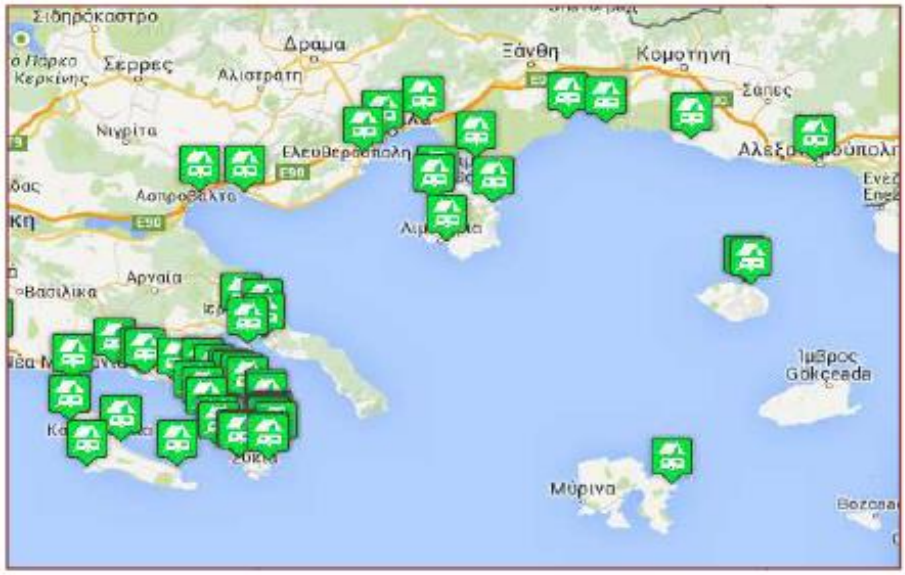


Figure 2-10: Camping sites in the Region.

Another important component of tourism is the ability of visitor - consumer to integrate and communicate with the local community and market. The important factor for the development of this relationship is to create a suitable consumer and commercial environment, so as the visitor to be able to choose and buy local products and services. According to European Investment Bank data (2013)[41] the average visitor consumes 30.93% of his/her vacation budget in the Region of Eastern Macedonia and Thrace to local products and services. This is encouraging since the presence of seven major urban centers in the Region form the profile of a mature tourist destination.

Other general tourist facilities include organized centers for providing visitor's information. Their operation is crucial for the visitors as they provide tourist information regarding sights and opportunities for activities during the visitor's stay, but also in providing more general information, such as accommodation, restaurants, and health care infrastructures.

Such infrastructures operate throughout the Region. In particular, in the Regional Unit of Drama, which is a unique winter destination in Greece, the Drama Visitors' Information Center in Aghia Varvara operates. In Kavala, which is the most popular tourist destination of the Region the Visitors' Information Center covering the information needs of the tourist destination of Kavala and Thassos operates. The information centers provide information and printed material. Information Centers is open every day throughout the year.

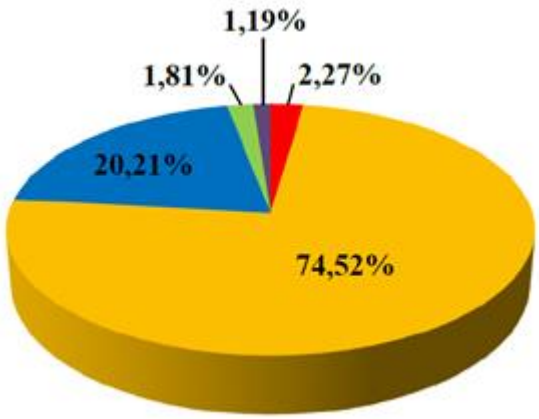
4 http://www.eib.org/en/infocentre/publications/index.htm

2.2.6 Agricultural and livestock activity

The share of agriculture in GDP at the Region of East Macedonia and Thrace has fallen rapidly over the last decade but the region still contributes significantly to the national production for crops such as wheat, tobacco, cotton, asparagus, potatoes, melons and cucumbers. This output is also the basis for a significant agro-industry in the area.

The agricultural sector (agriculture and livestock farming) is a focal point of economic activity in the East Macedonia and Thrace Region. The Region can be classified as mainly rural, because the primary sector is the main productive sector of the Region: the primary sector's share of the gross added value (GVA) of the Region is 6.2% (twice the national average), it represents the 20,7% of the total employment, while it also participates with about 40% of the total exports of the Region. However it is an important interconnection with the other sectors of the economy (secondary, tertiary): if it is taken into account that the participation of the primary sector is even greater than the officially recorded. It is important to mention that, according to a recent study, the agricultural sector directly contributes to an increase in Regional GDP of the amount of € 300 million.

Agriculture is still the most important activity in the Region, covering the highest percentage (74,52%). Figure 2-11 shows the total land use of the Region of Eastern Macedonia and Thrace.



Type of Area	Percentage
Artificial Surfaces	2.27
Rural Areas	74.52
Water Tumors	20.21
Forests	1.81
Other	1.19

Figure 2-11: Distribution of the total area of the East Macedonia and Thrace in land use

Cereal and fruit & vegetable productions are shown in Table 2-30.

Table 2-30: Harvested agricultural products, that were produced in the Region of Eastern Macedonia and Thrace in 2010.

Item Description	Quantity produced in tones
Wheat (soft and hard)	8.071,2
Maize	156.637,9
Barley	710,4
Rice	11.926,5
Foodstuffs (oats, vetches, clover, beans, barley)	4.032
Cotton	9.373,1
Sunflower	2.327,5
Beans	1.526,9
Chickpeas	6,8
Watermelons	13.857,8
Melons	2.379,9
Sugar beets	1.1960
Potatoes	1.523,5
Cabbages	1.134,6
Cauliflowers	3.038
Spinach	83,6
Leeks	297,4
Onions	86,3
Garlics	2,0
Lettuce	400,8
Chicory, endive	126,7

Tomatoes	10.890,9
Peas	5,5
Green beans	1.325,6
Okras	325,5
Zucchinis	512,6
Cucumbers	81,4
Eggplants	592,4
Asparagus	7.210,1
Others (parsley, dill, ...)	0,2
Edible olives	171,7
Olives for Olive oil	710,1
Pears	21,3
Apples	159,1
Peaches	18,6
Cherries	30,7
Apricots	0,2
Walnuts	10,9
Hazelnuts	11,3
Almonds	1,8
Figs	2,2
Table grapes	13,8
Grapes for Winery	149,2

Livestock farming has many potential for further development in the Region, as it is currently complementary. The relation between vegetable and animal production in the Region in terms of production value corresponds to the national average 7:3. Livestock production is mainly targeted at

the internal market, since Greece is particularly deficient in the production of animal origin products, while there is intense competition with cheaper imported products.

The number of each type of livestock reared in the Region of Eastern Macedonia and Thrace as well as the production of livestock products resulting for the year 2010 is shown in Table 2-31.

The quantity of meat reported reflects the number of animals that were bred and slaughtered within the Region. The slaughter of the animals took place either inside or outside the boundaries of the Region.

Table 2-31: Production of livestock products by units located in the Region of Eastern Macedonia and Thrace in 2010.

Item Description	No of Animals	Produced quantity of product
Horses (male and female)	42	-
Donkeys (male and female)	25	-
Cow's milk	9.650	21.214.796
Veal meet	5.197	1.197.465
Pigs	4.055	123.645
Sheep's milk	55.160	3.608.840
Lamp meat	44.483	480.513
Sheep wool	-	39.200
Goat's milk	3.688	309.296
Goat meat	2.687	26.377
Goat hair	-	818
Cheese (soft and hard)	-	294.885
Mizithra	-	250
Fresh butter	-	1.170
Young animal hides	-	1.727
Chicken eggs	120.834	4.396.360

Ducks	3.900	-
Gooses	2.945	-
Turkeys	685	-
Poultry meat	-	249.405
Rabbits	440	-
Rabbit meat	4.260	7.595
Honey	688	6.528

2.2.7 Industrial activity

The manufacturing sector is characterized by the dominance of relatively small sized and family-run enterprises, with an organizational structure that does not ensure dynamism in the strategic response to the challenges of the global arena and low technology intensity. This weakness exists due to the lack of clusters that could largely overcome economies of scale. The sectors with the highest concentration (48%, 2010) in terms of Gross Value Production are the processing of agricultural products, stone cutting, textiles and the processing of plastics and tires.

The industrial sector of the Region includes 234 processing units. The businesses that are located within the boundaries of the Region of Eastern Macedonia and Thrace were identified through the collection of data from the relevant Directorates for the Development of the Regional Units of Kavala, Xanthi, Rodopi, Evros and Drama.

The majority (44.5%) of these units are active in the food and beverage sector. The business classification is shown in Table 2-32.

Table 2-32: Number of Businesses per Activity in the Region

No of Businesses	**Activity**
104	**Food and Beverage**
5	Meat/ Poultry Processing
11	Fish/Shellfish Processing
14	Cereals Processing

23	Fruit and Vegetables Processing
6	Milk Processing
2	Production of Feeding stuffs
7	Production of pastry and dough products
3	Beverage industry
2	Salt Evaporation Pond
31	Bakery
3	**Clothing/Footwear**
1	Clothing Production
1	Footwear Production
1	Dry Cleaning
44	**Building Materials / Construction**
5	Building Materials Trading
4	Marble Processing
13	Production of metal window/door frames and other metal products
2	Production of plastic window/door frames
2	Production of glass panels
18	Carpentry / Furniture Workshop

24	**Machine Shop / Workshop for Automotive / Agricultural Machinery**
5	**Shipyard**
3	**Printing Shop**
45	**Fuels**
3	Firewood trading
42	Gas Stations
1	Manufacture of Paper
1	Production of Christmas trees
1	Production of Wedding and christening products
1	Production of plastic packages
1	Recycling unit of metal items
1	Municipal Waste Water Treatment – Municipality of Nestos

In the Regional Unit of Kavala, there are 161 Industries/Crafts (9.87%), while 58 (9.56%) and 17 (3.44%) businesses are located in the Regional Unit of Xanthi and Rodopi respectively, as presented in Table 2-33.

Table 2-33: Number of industries

Region	**No of Industries/Crafts**	**No in the Region of Eastern Macedonia and Thrace**	**Percentage**
Regional Unit of Kavala	1631	161	9.87
Regional Unit of Xanthi	607	58	9.56
Regional Unit of Rodopi	451	17	3.44

2.2.8 Other impacts from anthropogenic activities

As a result from the anthropogenic activities taking place within the boundaries of NP-EMATH, there is a significant amount of Municipal Solid Waste (MSW) produced. Within the administrative region of Eastern Macedonia and Thrace, in the year 2015, 245,960 tons of MCW were produced, which translates into 0.4 tons/resident/year, accounting for approximately 6% of the national MSW. On Table 2-34, the production of MSW per county within Eastern Macedonia and Thrace is presented.

Table 2-34: Annual Production of MCW within the Administrative Region of Eastern Macedonia and Thrace, for the year 2015.

Regional Unit	Annual Production of MCW (tn/yr)	Percentage (%)
Evros	59.833	24,3
Xanthi	42.644	17,3
Rodopi	39.866	16,2
Kavala	62.973	25,6
Drama	40.643	16,5
Total	**245.960**	**100,0**

Source: Management Body of Solid Waste in Eastern Macedonia and Thrace, 2016

The Regional Units of Kavala, Xanthi and Rodopi, regions where NP-EMATH is located, are responsible for the production of almost 60% of the total amount of MSW within the boundaries of Eastern Macedonia and Thrace, with 145.483 tns of MSW. The qualitative composition of MCW of Eastern Macedonia and Thrace is presented on Table 2-35.

Table 2-35: Categories of waste within the boundaries of Eastern Macedonia and Thrace.

Category of waste	Percentage (%)
Fermentable waste	45,8
Paper	15,3
Plastic	16,5
Metals	3,4
Glass	4,3
Wood	6,0
Miscellaneous	8,7
Total	**100,0**

Source: Management Body of Solid Waste in Eastern Macedonia and Thrace

Examining Table 2-35, becomes evident that the recyclable-useable waste (fermentable, paper, plastic, metals and glass) accounts for 85.3% of the total mass of waste for that region. Furthermore, 60.18% of the total amount of MSW, are biodegradable materials, while 26,27% are packaging materials. In the area covered by NP-EMATH, there are currently residing six municipalities from the regional units of Kavala, Xanthi and Rodopi. This results to a significant amount of anthropogenic

activities taking place within the boundaries of NP-EMATH. The percentages of NP-EMATH population on the total population of the three regional units are presented on Table 2-36.

Table 2-36: Population of NP-EMATH in comparison to the total population of the Regional Units.

Regional Unit	Total Population	Population of NP-EMATH	Percentage (%)
Kavala	124.917	16.467	13,18
Xanthi	111.222	9.515	8,55
Rodopi	112.039	2,720	2,43

Source: Greek Statistical Authority (population census), 2011

The six Municipalities, part of which are residing within NP-EMATH are: Maroneia – Sapes, Komotini, and Iasmos from the Regional Unit of Rodopi, Avdira and Topeiros from the Regional Unit of Xanthi, and the Municipality of Nestos from the Regional Unit of Kavala. The percentage of coverage of each Municipality, within the boundaries of NP-EMATH, is presented on Table 2-37. Based on the Regional Waste Management Plan of the Administrative Region of Eastern Macedonia and Thrace, and the percentages of Table 2-37, the quantity of MSW within the boundaries of NP-EMATH is calculated and presented on Table 2-38.

Table 2-37: Percentage of the Municipalities within NP-EMATH (based on population).

Municipality	Percentage (%)
Avdira	6,4
Iasmos	10,78
Komotini	1,44
Maroneia – Sapes	1,83
Nestos	73,74
Topeiros	71,89

Table 2-38: MSW within the boundaries of NP-EMATH (for the year 2015).

Municipality	MSW in tonnes
Avdira	591
Iasmos	476
Komotini	366
Maroneia – Sapes	100
Nestos	6.402
Topeiros	3.189
Total	**11.124**

By examining Table 2-38, MSW within NP-EMATH are approximately up to 4,5% of the total MSW quantity produced within the Administrative Region of Eastern Macedonia and Thrace as a whole. Moreover, this number can be translated to 0,39 tonnes of MSW/resident/year, for the residents of NP-EMATH. The management of MSW in the wider area is taking place with the use of landfills and

numerous uncontrolled disposal sites. More specifically, currently, there are three landfills within the boundaries of the administrative region of Eastern Macedonia and Thrace (Mpourtsalas et al., 2011):

- Landfill of Kavala: In Eski Kapou, 10 km from the city of Kavala. The landfill serves a total of 74,120 residents.
- Landfill of Xanthi: Residing 10 km west of the city of Xanthi. It serves all the regional unit of Xanthi, while it has a capacity that reaches up to 400.000 m^3.
- Landfill of Komotini: Residing in the area Siderades of the Municipality of Komotini. It serves around 100.000 residents, and its capacity is 590.000 m^3.

Even though the landfills mentioned above are not within the boundaries of NP-EMATH, they are in close proximity (under 10 kilometers) which means that their impacts could affect part of the national park, especially regarding the ambient air quality of the area. Regarding the uncontrolled disposal sites, currently there are 28 active sites, within the Region of Eastern Macedonia and Thrace. The number used to be significantly higher, with 333 disposal sites active in the previous years, but it is unclear whether some of them where active within the boundaries of NP-EMATH. Four (4) of the existing disposal sites are currently in rehabilitation process (Mpourtsalas et al., 2011). Besides the element of MSW, in close proximity of NP-EMATH there are numerous heavy industrial activities taking place, resulting in the production of industrial waste, that is currently disposed uncontrollably in the area. In the area of Nea Karvali, within less than 5 km from the boundaries of NP-EMATH, the operation of a chemical fertilizer production plant, has led to the production and uncontrolled disposal of a by-product called Phosphogypsum (PG). Annually, 300.000 tonnes of by-product PG are produced (Greek Ministry of Environment and Climate Change, 2011), and currently are disposed in an area near the boundaries of NP-EMATH, as shown in Figure 2-12.

Figure 2-12: Distance from the Phosphogypsum disposal site to the boundaries of NP-EMATH.

Based on estimations, there are over 4 million tonnes of PG residing in the area, with potential impacts not only in the area of NP-EMATH, but in the whole wider area of the Regional Units. Moreover, from the operation of the fertilizer plant, 200.000 tonnes of CO_2/year (Greek Ministry of Environment and Climate Change, 2011), are reaching the atmosphere, with potential impacts on the ambient air quality. This amount of CO_2 is produced during the ammonia production, which is one of the most intensive production processes in the chemical industry sector, requiring large amounts of energy and natural gas.

Chapter 3: Study Area 2-Rila National Park and catchment area of the river basin of Blagoevgradska Bistrica (BG)

3.1 Status of Nature of Study Area 2

3.1.1 Geographical characteristics

3.1.1.1 Natural geographical characteristics of Rila National Park

Rila is the highest mountain range on the Balkans and in Bulgaria. It is located in the south-west part of the country and it is almost in the central part of the peninsula. The area of the mountain range is equal to 2393 km^2 (Stoychev, Petrov, 1981). On the higher and more attractive part of the mountain range it is situated Rila National Park – the biggest national park in Bulgaria (81046.0 ha). In 1992 it was declared to be a national park. It consists of four reserves which occupy about 20% of its territory: Central Rila, Ibar, Parangalitsa and Skakavitsa.

The distinctive feature of Rila is its massive character, result of its morphogenetic development. Regardless of this, because of the deep cutting of the valleys of the rivers Beli and Levi Iskar, Rilska, Iliyna, Blagoevgradska Bistritsa and Belishka, it is divided into four clearly separated parts: East, Central, North-West and South-West. Within the boundaries of the national park there are parts of the four Rila lakes. The largest area belongs to East Rila (45,1%). The second largest area in the park belongs to North-West Rila (21,5%), followed by South-West Rila (20,7%). The smallest area of the park belongs to Central (Middle) Rila (12,7%) which is caused by the fact that a great part of it is included in Rila Monastery Natural Park. The highest point in Rila National Park, in Rila and in the whole Balkans is the peak Musala (with altitude of 2925.4 m). The average altitude of the territory of the park is 2038 m. The bigger part of the park (57%) has altitude of 2000 m.

Important morphometric indexes which characterize the relief and which have a broad application are the *horizontal* and the *vertical* segmentation. The horizontal segmentation represents the density of the thalweg network per unit area. Within the boundaries of the park this parameter changes from 0 km/km^2 to 3,47 km/km^2. Lowest values of below 0,5 km/km^2 are registered on the ridges and the broad watersheds mainly in East and South-West Rila. The highest values are registered in the lower part of the mountain slopes – up to 3-3,5 km/km^2. The average value of the horizontal segmentation for the territory of the park is 1,09 km/km^2.

The vertical segmentation of the relief shows the intensity of the endogenetic relief-forming processes and the connected with this intensity of incision of the river and valley network. The value of the parameter varies from 70 m/km^2 to 850 m/km^2, as the average value for the whole territory of the park is significant – 398 m/km^2. The highest values of this index above 800 m/km^2 are registered in the valleys of the rivers Beli Iskar and Rilska.

Geological structure

The territory of Rila National Park belongs to the Alpine orogenic belt, and more concrete to its internal parts. Because of this this territory possesses all the typical features of the high metamorphic complexes, built of rocks, formed at a great depth in the earth's crust (above 25 km). The region is characterized with great vertical segmentation, caused by the action of extension processes which are active in the moment. On the territory of the park and in the areas near it there are rocks which originate from the Precambrian to the Quaternary period.

The mountain is considered to be a part of the Rhodope tectonic zone, located to the south of the Marishki shev which separates it from the Balkanides. According to the modern understanding the formation of the Rhodope zone is caused by Cretaceous- Palaeocene collision processes which have led to the formation of sin-metamorphic thrust construction.

Basic rock complexes

On the territory of Rila National Park and its closest periphery it is found that there are three types of rocks: metamorphic, magmatic and sedimentary. The metamorphic rocks are the oldest and include both metamorphosed sediments (schists, paragneisses, marbles) and metamorphosed magmatic rocks (gabbros, basic volcanic rocks; metamorphosed granites, changed into orthogneisses and etc.). The metamorphic rocks include younger magmatic rocks with different sizes. Some of these magmatic bodies have enormous sizes like for example the Rila-Rhodope batholite. The metamorphic and magmatic rocks are traditionally combined and characterized as a crystalline basement or a fundament. The sedimentary rocks are represented by different deposits of continental type, formed in lake and river conditions and which are younger than the crystalline fundament.

The metamorphic rock complex differentiates some lithotectonic units – Ograzhdenska, Malyovishka and parts of the Chepinska, Trakiyska, Sarnishka and Mestenska lithotectonic units. In general, the rock composition includes gneisses (most often biotite gneisses), amphibole and biotite schists, binary gneisses, amphibolites, layers of marbles, bodies of metagabbros and serpentanized ultrabasite rocks (http://rilanationalpark.bg/assets), Dimitrova, Katskov; 1990, Marinova, 1991; Marinova, Katskov, 1990; Marinova, Zagorchev, 1990.

Magmatic rocks

The Rila-Rhodope batholite represents a huge massif of magma with granitoid composition which has gotten cold at a great depth (about 15-20 km) in the earth's crust. This plutonic body is the biggest intrusive in the Rila-Rhodope region (about 2200 km^2). It forms almost the whole East and

South Rila. Within the boundaries of the batholite on the territory of Rila National Park there are several types and namely: granodiorites, coarse-grained porphyry granitoids, equigranular granites, muscovite plagiogranites, leucogranites, dike rocks.

The Equigranular granites are a dominant lithological type within the boundaries of Rila National Park. The coarse-grained, almost structurless biotite granites are typical. The granodiorites and the coarse-grained porphyry granitoids form the eastern periphery of the batholite. One of the latest igneous activities which are connected with the Rila-Rhodope batholite are represented by muscovite plagiogranites and leucogranites. They are found in the region of Kostenets and Dolna Banya, as they also form a spreading in the north-west – south-east stripe which starts from the seven lakes, goes through Kirilova polyana to Yakoruda.

Sedimentary rocks

They have exact subordinate spreading on the territory of Rila National Park. In the north-eastern periphery of the park, in the region of Kostenets and Raduil, there are Oligocene sediments, mainly represented by sandstones which turn into gravelites and clay aleurolites (Dimitrova, Katskov, 1990). The dominant for Rila National Park sedimentary rocks are of Quaternary age. Depending on their origin, they can be divided into several categories: glacial (glacial), fluvioglacial, alluvial, colluvial, deluvial and proluvial.

The glacial formations include the Pleistocene unwelded together or poorly welded together rocks which are a result of the accumulative activity of the glaciers. They can be met as basic and frontal moraines on the river valleys and as lateral moraines on the hills which are between the valleys. The moraines are usually with meter to decameter power and include different blocks in a sandy welding.

Tectonic structure

Rila is a part of the regional positive structure which includes Rila and parts of West Rhodopes. It consists of both highly metamorphic rocks and granitoids of Tertiary age. It is accepted that the formation of the positive structure is a result of late-orogenic to post-orogenic extension processes, synchronous to the introducing of the later phases of the Rila-Rhodope batholite.

Within the boundaries of the park and close to it there are two plastic compression zones (Bistrishka and Dodov-vrashka) and two extension zones (North Rhodope and Yadenishko-Grashevska).

Geomorphological characteristics

When it comes to the development of the relief and the formation of the mountain, it can be separated four stages. The compression stage is connected with the metamorphism of the rocks from the metamorphic bedding and leads to the formation of the compression shear zones. These processes began during the Cretaceous and the Palaeocene at a great depth (>20 km) under the conditions of increased temperatures and pressure.

The early extension stage began during the Eocene and it is connected with the extension of sloping zones of the type “detachment faults” which are typical for the north periphery of Rila. During this stage the situation that concerns the rocks from the metamorphic bedding and the intruded in them granitoids has radically changed. As a result of the extension they were moved from depths of no more than 20 km to the upper crust levels (3-5 km) where they were subjected only to small deformations.

The beginning of the late extension stage has not been yet well defined, as it can be although suggested that this happened during the Mid-Late Miocene (15-10 Ma). The deep cutting of the river network started at that time. The moved eroded rock material is deposited in Miocene Quaternary graben lowerings on the periphery of Rila.

New stage in the morphological development of Rila started with the beginning of Pleistocene when the mountain was subjected to glaciations. Glaciers have reprocessed the existing relief, as they have formed the typical circuses and have widened the river valleys, as they have turned them into glacial valleys. At the end of the Pleistocene the climate changed which led to gradual pulling aside of the glaciers and formation of a series of frontal stadial moraines. During the Holocene the glacial relief was reprocessed by the contemporary morphogenetic processes – aeolation, erosion and denudation. The steep unstable slopes generated a lot of colluvial material.

Genetic types of relief

Rila mountain range has different relief which is a result of different morphogenetic processes. Some of them are caused by the action of processes from the past, as other processes continue today and they give a final touch to the appearance of the mountain. Today on the territory of Rila, as well as within the boundaries of the park, the following genetic types exist: glacial, periglacial, planational, fluvial and gravitational. Together with these types of relief, connected with natural morphogenetic processes, it has to be also added the anthropogenic relief which is a result of human activity.

The glacial relief in Rila was formed during the Pleistocene glaciations when on the ridge parts of the mountain and at altitude of more than about 2 200 m the snow cover did not melt during the summer and this led to the formation of firn fields and glaciers. At the end of the Pleistocene the climate got warm and the glaciers disappeared but after them the typical glacial forms remained, as the same impart the typical Alpine appearance of the mountain and are the reason for the thousand tourists to visit the national park every year. Because of the fact that are no glaciations in Rila now, all the glacial forms are relict.

It is discussed the number of the glaciations during which the relief of Rila has transformed under the influence of the exaration and the connected with it accumulation. More of the earlier researchers believed that the glacial forms in Rila are caused by the last Würm glaciation. The main glacial forms are indeed caused mainly by the exaration and accumulation during the last glaciation which continued from approximately 26000 to 12000.

The most expressive and widespread forms from the relict glacial morphological complex are the circuses. They represent a negative armchair form with steep slopes and a slant bottom which is often occupied by one or more lakes. The height of the circus bottom and the circus threshold show the altitude of the snow line during the time of their formation. Below this line the valley glacier flows out, as while moving downwards it widens the river valley and it makes it to have similar to the letter "U" transverse profile. The biggest glacial valleys in Rila are those of Beli Iskar and Rilska reka. According to Glovnya (1957) the length of the first glacial valley is 22 km. The circuses have mainly north and north-east exposure.

Other typical exaration forms are the pyramidal peaks and the sheep's humps. The pyramidal peaks represent sharp peaks which are difficult to be reached and which are formed on the watershed ridge between the circuses. They can be often met in the glacial valleys of Rila. The glaciers also carries out accumulative activity and this leads to the formation of moraines – unsorted superimpositions which include huge rock pieces with sizes of some cubic meters, sand and even clay. One of the lowest frontal moraines in Rila is the one that is situated in the valley of Beli Iskar – 1150 m.

The periglacial relief is typical for Rila and at altitude of more than about 2 000-2 100 m. Unlike the glacial, which is extremely relict, the periglacial relief is also a result of the contemporary morphogenesis. The periglacial processes are mainly connected with cryogenic processes, as the temperature often reaches 0°C but it can be claimed that not long ago it was formed a zone with permanent frost, known in the literature as "permafrost".

One of the most typical forms are the rock glaciers. They are positive forms of the relief which represent heaping of coarse and rough rock blocks in the shape of a tongue which fills up the valley or a series of banks in the beginning of the slope. Other typical forms which are connected with the cryogenic morphogenesis are the rock seas, flagstones, rock stripes, rock tongues and the grass hills.
The broad spreading of the slopes with a great incline determines the important morphogenetic role of the processes which are connected with the so called "own gravitational processes". In fact, their influence is usually combined with the periglacial processes. The most widespread forms are the screes which are always situated under a rock wall, source of the colluvial material. In the screes it is often met the sorting out of the material in compliance with the size of the pieces. Their size increases from the bottom of the wall (and the top of the scree) to the foot of the scree. The rockfalls where there is no sorting out of the material are typical. They are formed in the cases of single landslides, as usually the material is deposited close to the place of tearing off.

The most frequent gravitational process is connected with the slow crawl of the weathering cover down the slope. Because of the slow speed of moving this process remains invisible but it forms typical grass stairs. They are most typical for the Alpine and the Sub-alpine zone of Rila on slopes with incline of 30-40^{o} and they are formed under the combined activity of the gravitational and periglacial processes. The gravitational processes are connected with risky and dangerous phenomena like the rockfalls and the avalanches. The planational relief is connected with the stages

of tectonic rest, as during these stages the exogenous earth powers have denuded and levelled away the territory, changing it into almost flat area. During the next tectonic activity it has fractured and residues thereof can be found on the wide ridge flat areas and slope stairs. In this sense this type of relief in Rila is extremely relict.

The fluvial type of relief has a subordinate role on the territory of the national park. It is connected with the processes of erosion and accumulation, as the erosion is of great importance. After the recession and the melting of the glaciers the erosion processes has intensified. The greatest proof of this are the bottoms of the glacial valleys where the contemporary river bed is averagely cut into the bottom of the glacial valleys with about 4 - 5 m. Within the boundaries of the park more notable are the accumulative processes on the bottoms of the circuses where it is observed meandering of the course of the river and accumulation of sediments. These processes lead to silting of the circus lakes and their turning into bogs.

Risky geological and geomorphological processes and phenomena

The avalanches represent the greatest danger. The big real inclines of the slope and the accumulation of significant quantities of snow during the winter are prerequisites for their formation on the territory of Rila National Park. The avalanches most often forms on the slopes with incline of between 35° and 50° because usually the snow on the steeper places does not last for a long time. There are a lot of places where every year or almost every year there are avalanches which fall down. There is a great danger of avalanches in the North-West and Middle Rila, as well as in the other regions of Rila. The often avalanches influence both on the plants and the relief. They lead to deforestation, as well as to deforestation of the dwarf pine trees and they create accumulative cones in the foot of the slopes through their denudation and corrosive activity (Stoyanov, 2011).

The rockfalls are noticed on the steep slopes, as this is a normal process which leads to sudden changes in the relief. The bigger natural rockfalls are in the circuses of all parts, as the smaller rockfalls can be seen on the ledges of the roads in the mountain. They are of greater importance because they destroy the infrastructure and block the access. Recently they have been seen on the way around Slavova reka, the cascade road near the river Polenitsa in the area “Velkovitsa” in the valley of Chavcha. The landslides are another risk factor but in Rila National Park there are no hydrogeological conditions which can advantage for the formation of big landslides.

Climate

The territory of Rila National Park is mainly situated in the transitional continental climate zone of the country which holds intermediate position in comparison with the other two main climate zones in Bulgaria: moderate-continental from the north and continental-Mediterranean from the south. In the south areas a part of the park belongs to the continental-Mediterranean climate zone.

The duration of the **sun shining** is determined by the astronomical factors, by the peculiarities in the atmospheric circulation, manifested through the regime of cloudiness, as well as by the orographic conditions. On the highest parts of the park the annual duration of the sun shining is about 1930

hours, as the maximum is in August – about 250 hours per a month and the minimum is in December and January – 113 – 112 hours. This minimum monthly value is higher than the low mountain areas because during the winter the high parts of the mountain often remain above the level of the cloudiness.

With the increase of height the **temperature of the air** decreases, the dampness and the precipitations, including the solid, increase, and the speed of the wind increases, as changes in the regime of the climatic elements occur. This is also very complicated by the influence of the rest elements of the relief – the exposition and the incline of the slopes, the type of the relief forms – negative and positive, the disposition of the main orographic ridges in respect of the dominant atmospheric transmission and etc. This leads to differences in the inflow of radiation, formation of temperature inversions, increase of the frequency of the mists, and expressed irregularity of the distribution of precipitations. The relief is also of great importance for the formation of local atmospheric circulation – mountain-valley winds and the orographicly determined falling winds on the slopes. Another thing that is of importance is the character of the covering surface, especially the existence of snow cover which determines the significantly lower temperatures during the spring than those during the autumn.

Through the system of the main pressure centers, the total atmospheric transmission determines the transmission of different air masses to the territory of the country and respectively to the region. The following pressure centers are of main importance: Icelandic and West Mediterranean minimum, as well as the Azores, Scandinavian and east European maximum – through the emitted by these pressure centers cyclones and anticyclones.

The temperature of the air shows a significant difference between the north and south macroslope of the mountain. The difference can be best seen in the lowest part of the territory of the park where averagely per annum it reaches a whole degree.

The average annual temperature of the air is 2.6°C for the north macro exposure and 3.1°C for the south, as the difference decreases with the increase of the altitude. In the annual course of the temperature some peculiarities are noticed, as the same are determined by the higher altitude. The spring is cooler than the autumn and this difference increases with the increase of the altitude. For the height of Borovets the difference between the average temperatures of April and October is 1.4°C and it reaches 4.2°C for the height of Musala. In the same way it also decreases the annual temperature amplitude. For example at altitude of 800 m the annual temperature amplitude is about 20°C and at 2 800 m – about 15°C. With the increase of the height there is a tendency for equalizing of the January and February temperatures, respectively the July and the August, as above 1 800-2 000 m the maximum is in August and the minimum – in February (Table 3-1). For the years from the 21st century it is noticed a tendency of increase of the temperatures of the air, as this started in the nineties of the previous century (Table 3-2).

Table 3-1. Average monthly temperatures of the air (for the period 1961-1990).

Station	Alt.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Av. year
Blagoevgrad	410	0.6	3.0	7.0	12.0	16.5	19.7	22.0	21.7	18.0	12.3	6.8	2.5	11.8
Rila	470	0.4	2.5	6.4	11.4	15.9	19.2	21.3	20.9	17.4	11.8	6.4	2.0	11.3
Borovets	1346	-3.9	-3.1	0.0	4.9	9.7	13.1	15.0	14.6	11.4	6.3	2.1	-1.9	5.7
Musala	2925	-10.5	-10.7	-8.5	-5.3	-0.9	2.2	4.6	4.8	2.3	-1.1	-5.0	-8.6	-3.1

Table 3-2. Average monthly temperature of the air of Musala station (for the period 2000-2011).

-10.1	-10.6	-8.1	-4.9	0.0	3.6	6.2	6.5	2.3	-0.6	-4.2	-8.2	-2.3

The absolute values of the temperature of Musala peak are -31.6°C and 20.0°C.

Precipitations

The precipitations grow with the increase of the altitude from about 600 mm per annum at altitude of 800 m to about 1100 mm in the high mountain. There is a difference in the annual precipitation sums between the north and the south mountain macroslope but is not so significant – about 20 mm precipitation quantity.

The internal annual distribution of precipitations in the park is determined to a large extent by the interaction between the Mediterranean and the moderate-continental climatic influence. The most abundant are the precipitations in May and June but in some stations it is noticed a secondary late autumn and winter maximum. The minimum of precipitations is during the summer. This determines the differences of the seasonal distribution of precipitations between the north and the south macroslopes.

During the year it averagely rains 130-160 days but during some separate precipitation years it rains even more. The number of the days with rainfall in comparison to the days with snowfall is higher in the lower mountain belts, as with the increase of the altitude this correlation changes in the opposite direction. For example, in Samokov the annual number of days with rainfall is 95 and with snowfall – 37, while on Musala peak – it is respectively 25/122.

Snow cover

There is snow cover every year but it is not permanent in all the parts of the mountain (with continuous duration of more than 30 days). The average annual number of days with snow cover is quite different depending on the altitude, exposition, form of the relief and the afforestation. At altitude of 1 000 m this number is about 70 days, at altitude of 2 000 m – about 150-160 days and at altitude of 2 900 m – more than 200 days.

An important feature of the snow cover is its height. The average maximum height in the low mountain belt is during the second-third ten days of January when it reaches 15-20 cm. In the lower mountain parts (above 2 000 m) this happens during the first-second ten days of March with height of about one meter. In separate years the maximum snow cover can reach 250-350 cm. In recent years, however, there are some reasons for people to believe that the height and the duration of the

snow cover, although with a variable rate, decrease. The annual number of days with **mist** increases in proportion to the increase of the altitude because on the high mountain parts in many cases the clouds are registered as mists. However, together with the altitude, the formation and continuation of the mists depends a lot on some other physicogeographical factors like the form of the relief, as well as the exposition and the incline of the slopes. The average annual number of days with mist for the territory of the park is about 60.

The regime of the **winds** depends on the atmospheric circulation and the peculiarities of the relief. Despite of the different speed and the direction of the wind, determined by the relief, the following is observed: during the winter predominate winds from the sector north-west – south-west, during the summer the frequency of the north and north-east winds increases (Stoychev, Petrov, 1981). **The speed of the wind** increases a lot with the increase of the altitude. Averagely per year the speed changes from 1.4 m/s in the foot of the north macroslope of Rila and 1.0 m/s in the foot of its south macroslope to 7.6 m/s – on the ridge.

When it comes to the different seasons, the speed of the wind increases from the summer to the winter months, as this can be better seen if the altitude is higher. The strong winds (with speed of more than 14 m/s) are most often noticed on the mountain peaks. There they exceed 20% of the total number of the findings. During the warm half of the year the mountain-valley winds are often noticed. Other local wind which is typical for the north slopes and foots of the mountain, mainly during the spring, autumn and the winter, is the foehn which leads to sudden warming-up of the weather and melting of the snow.

The global climatic changes will also influence over the extreme values of the two basic climatic elements – temperature of the air and precipitations. In respect of the temperature, the increase of the average values during almost all the months of the year will increase both the minimum and maximum temperatures. When it comes to the intensity of the precipitations during the separate months, the trends in Rila are different. More significant increase of the intensity is expected in February, August and September. The decrease will be in April, May, June and October.

During the warm half of the year the increased thermal levels in the mountain will probably lead to increase of the frequency of the local extreme winds, mostly expressed through increase of the number of cases with tornado.

3.1.1.2 Natural geographical characteristics of the drainage basin of the river Blagoevgradska Bistritsa

Morpho-hydrological characteristics

The reviewed by us region is a part of the south-west part of Rila mountain range. Despite of the massive character of the mountain because of its morphogenetic development, the deep valleys of the rivers Rilska, Beli Iskar, Iliyna, Belishka have segmented it into four well detached parts: north-west, central, east and south-west. The south-west part of Rila mountain range, a part of which is the

reviewed by us region, is the lowest but too extensive part of the mountain. It occupies more than 32% of its area.

The valley of the river Blagoevgradska Bistritsa is located in the central part of the south-west part of Rila. The river divides it into two main orographic ridges – north, which can be called Arizmanishko, and south – Ravnishko or Parangalishko. The Arizmanishko main ridge orographicly begins from the Stob pyramids with peak Stobska chuka 923 m and ends with the peak Uzunitsa 2606 m which rises above the col Kadiin grob.

This ridge has mainly west – east direction and the greatest part of it is watershed of the river Blagoevgradska Bistritsa from the north. In the north and in the south from it are separated too short side elevations which reach the deeply cut beds of the river Rilska and the river Blagoevgradska Bistritsa. On the ridge from the west to the east there are peaks with gradually increasing height, as some of the most popular are Tsarev vrah – 2378 m, Golyam Mechi vrah – 2618 m and Angelov vrah – 2643 m. The local orographic centre in this case is Golyam Mechi vrah which is the second highest peak in the south-west part of Rila. It connects the south ridge of this part – the Ravnishko whose direction is from south-west to north-east and in contrast to the north, it is deeply indented to many low elevations. From the west to the east the main peaks are the following: Popova glava – 1 023 m, Chakalitsa – 2228 m, Ravnik (Parangalitsa – 2419 m), Ezernik – 2485m and Malak Mechi vrah – 2474 m. To the south of the peak Vadatepe (Skachkovets), east of the valley of Osenovska reka it is separated the big orographic branch of the Parangalishko bilo, as this is done in south-west direction and it ends with Kapatnik – 2170 m, rising above the col Predela.

In the north the border of the drainage basin of the river Blagoevgradska Bistritsa coincides with the Arizmanishko bilo. Within these borders the water catchment area is represented by two parts: Mechivrashki and Tsarevvrashki. The main ridge is levelled and wide. The north slopes are descending steep towards the valley of the river Rilska. Its south slopes are more slanting. After the peak Prashka /1 365 m/ the ridge branches out to many secondary elevations which form the west slope of the mountain. In the west and south-west following the watershed of the river Blagoevgradska Bistritsa and the river Telkiyski dol the ridge lowers and east of the village Dabrava it reaches the foot of the mountain at altitude of about 800 m. In the west – south-west the watershed follows low hilly heights and arable areas, as it reaches the mouth of the river in the river Struma, not far away from Strumsko which is a residential district of Blagoevgrad.

In the south the water catchment area includes parts of the Parangalishki and Harsovski part of Rila. The watershed, outlining the water catchment area of Blagoevgradska Bistritsa form the east and south, begins from Golyam Mechi vrah (2617 m). To the south and south-west the watershed first goes through the col Mechi prohod (2155 m), as after this in the south-west and on the ridge of the Parangalishki part it reaches the main peak – Skachkovets (2351 m). From here the watershed line goes north-west and it separates the drainage basins of the river Slavova, a left feeder of Blagoevgradska Bistritsa and the primary feeders of the river Osenovska, flowing away to the south. When it reaches Boli vrah, the watershed bends again at 90° and in the south-west direction through

Medni vrah it reaches the peak Yurukdzhamiya /1 188 m/. In this part the watershed separates the drainage basins of Harsovska reka from the north-west and Osenovska from south-east. After the peak Yurukdzhamiya, the significantly lowered ridge again directs to north-west, as it separates Harsovska reka from Aydarovska reka. After a new turning to the south-west, the watershed decreases to 450-500 m, it outlines the south fence of the drainage basin of the river Bistritsa in Elenovo which is a residential district of Blagoevgrad. It subsequently bends in the north-east and across Strumsko residential district it reaches the mouth of the river Blagoevgradska Bistritsa in the river Struma.

Hydrogeographical characteristic of the river and the drainage basin

The drainage basin of the river Blagoevgradska Bistritsa fully belongs to the Rila-Pirin region from the mountain subregion of the region with continental climatic influence over the flow. The total area of the drainage basin of the river Blagoevgradska Bistritsa is 208 km^2, as the highest point is Golyam Mechi vrah (2617 m) and the lowest – Blagoevgrad (308 m).

In natural aspect it is one of the most remarkable valleys in South-West Rila. The river takes its source at altitude of 2385 from the scree block which covers the south slope of Golyam Mechi vrah and it runs into the river Struma south-west from Blagoevgrad. With its total length of 41 km Blagoevgradska Bistritsa seems to be the longest river in South-West Rila. The average incline of its river bed is 51.8%.

The valley of Blagoevgradska Bistritsa is developed almost in east-west direction, occupying the lowered space between the Mechivrashki and Tsarevvrashki part of Rila from the north and the Parangalishki and Harsovski part from the south. From Golyam Mechi vrah to Kartalska polyana the valley is wide and has a flat bottom. After this it becomes very narrow and it has the typical traits of a gorge – with very steep slopes. After this the river cuts into the granite shoots which connect the Kadiyshki with Ismailishki part of Rila. In this part the feeders of Blagoevgradska Bistritsa are very impetuous, with steep valleys, strewed with beautiful waterfalls. After the village Bistritsa the river bends south-west. In this area the river bed is wide and covered with big alluvial alluviums. The tributary rivers form very expressive alluvial cones. After the mouth of Harsovska reka the valley again gets narrow, it looks like a gorge which continues to Blagoevgrad. After passing the town the river forms a wide alluvial-proluvial cone, ending by the river Struma.

The coefficient of asymmetry is with a positive sign which shows that the river Blagoevgradska Bistritsa has a better developed left part of the drainage basin than the right. The average altitude of the water catchment area is 1 467 m and the average incline – 0.442%.

The river Blagoevgradska Bistritsa segments the region deeply, as in places the difference of the altitude between the river and the watershed ridges exceeds 1 000 m. Its main direction is east – west and it separates the region into two asymmetric parts: right and left part, as they are respectively represented by the right and left feeders with their drainage basins.

The main right feeders which are included in the water catchment area are the rivers Kartalsko dere, Dobropolski dol, Predimer, Kovachitsa and Razhdavitsa. These feeders of the river are short and with a great incline. More sizable are Zloto dere which drains the territory between the peaks Gorna Kadiitsa and Arizmanitsa, and Kartalsko dere, rising south-west from the peak Arizmanitsa. Their drainage basins are flat and wide in the upper currents because they take their source from denudation flat areas. The river Predimer collects its waters between Tsarev vrah and the peak Rizvanitsa, as it flows in a deeply cut valley in south-west direction. The river Kovachitsa is the longest one, as it has the biggest drainage basin. It starts in the peak Rizvanitsa. As it flows almost parallel with the river Blagoevgradska Bistritsa, it collects the waters of the rivers Babkite, Argachka and Svetetso and in Brenyovska quarter of the village Bistritsa it bends south and it runs into the main river. The rivers Razhdavitsa, Ruzhen andak and Olchanets are shallower, drying up some years and with a torrential character.

As it comes to the left feeders of the river Blagoevgradska Bistritsa in the upper current, most significant are the rivers Parangalitsa, Haydushka and Kriviya uluk. Parangalitsa is formed of the merger of Golyama and Malka Parangalitsa which collect their waters from denudation flat area between the peaks Merdzhika and Parangalitsa. It runs into the main river in the area “Bivolarnika”. The rivers Haydushka and Kriviya uluk flow in deeply cut and almost rectilinear valleys and they run into the river Blagoevgradska Bistritsa in the area “Kartalska polyana”. Two other smaller left feeders are the rivers Bahchalaka and Kalishteto which have unstable regime.

Other more significant rivers are: Harsovska, Slavova and Mishavets. The river Harsovska takes its source south-west from Boli vrah in the Harsovski part and it is the longest feeder of the river Blagoevgradska Bistritsa. It first flows south and then it suddenly turns west and it runs into the river Blagoevgradska Bistritsa in the area Bachinovo. Its main feeder is the river Marulevska which starts north-west from Medni vrah. The river Harsovska crosses the territories of the villages Gorno Harsovo and Marulevo and it passes near the territory of the village Delvino. Its waters are used for irrigation.

In the forestry enterprise “Slavovo” the deepest feeder of the river runs into it, as this feeder is the river Slavova. It collects its waters from some bogs in the area Shiligarnika under the name Gurgutnitsa and after this it mainly has right feeders, as some of the more important are Chatma dere and Tapaneto.

Its last left feeder for the region the river Blagoevgradska Bistritsa receives east from the park Bachinovo – the river Mishavets. The water catchment area of the river Blagoevgradska Bistritsa is notable for a dense river network. This is a reflection of the combination of different factors – great inclines of the relief, the predominant crystalline rocks, the great number of precipitations and the relatively low level of evaporation which is typical for the higher altitude. The drainage basin of the river is characterized with shorter and steep right slopes where the incline of the rivers is greater, unlike the slanting slopes of the rivers which flow in the left part of the water catchment area.

Geological tectonic structure

The geological foundation in which it is formed the valley of Blagoevgradska Bistritsa is characterized for comparatively weak petrographic diversity. Greater part of South-West Rila is built of metamorphic rocks. The age of the highly crystalline metamorphic complex is determined as Precambrian and even Archaean. Str. Dimitrov /1946/ divides the metamorphic rock complex into three separate subcomplexes, called suites. The valley of the river Blagoevgradska Bistritsa belongs to the second suite, the so called amphibole-leptite suite. It reveals itself at Golyam Mechi vrah and between the village Bistritsa and Kartala area. In its basis it is represented by binary gneisses. They alternate with amphibole and biotite schists and very rarely with quite low-powered marbles. Above the basis of the middle suite there is a series of powerful amphibolites among which there are biotite gneisses and small spots of schists and marbles. In the spring area can be met Palaeozoic metamorphic rocks – gneisses, amphibolites, amphiboloschists and mica schists.
The most widespread are the south Bulgarian granites in the water catchment area of the river. A typical trait of the Rila granite is its relatively great sameness and constancy in the mineral composition and in its structurally-texture peculiarities. The main mass of the granite is represented by massive biotite granite. Another typical trait is its wealth of aplitic and pegmatic veins.

The mineral composition of the granites includes potash feldspar, microcline, albite, oligoclase, quartz, muscovite and really small quantities of biotite, garnet, beryl, ilmenite and apatite. The granites are light and have middle and coarse-grained structure. They build the high parts of the region (Golyam Mechi vrah).

As a result of the tectonic movements the rocks are very crumbled which advantages the advance of the weathering processes. Under their influence interesting huge block rock heaps have formed, as often they have odd appearance. With its typical slaty weathering in the relief, really well are distinguished the granitic gneisses which create interesting forms.

On the territory of Blagoevgrad the valley consists of the mentioned above Palaeozoic metamorphic rocks. Part of the right valley slope on the territory of the town consists of Tertiary sedimentary rocks – conglomerates, sandstones, sands, clays and gravels. They can be seen in places north of the town, as well as in the watershed with the river Aydarovska. The bottom of the hollow of Blagoevgrad is occupied by Quaternary alluvial-prolluvial deposits.

In the upper current of Blagoevgradska Bistritsa up to the altitude of 1 400 m there are preserved typical Pleistocene glacial superimpositions – moraines. The morainic granite blocks are rounded and have different sizes, as some of them have diameter of up to 120 cm.

M. Glovnya (1957) proved that the east-wester direction of the valley of Blagoevgradska Bistritsa from its spring area to the village of Bistritsa and the south-west direction of the river after the village are characterized by tectonic lines which in Rila have major directions: west-east, north-south and north-east – south-west.

The young tectonic movements on the territory of the examined valley are very important factor which determines the rhythm of its geological development. The high seismicity is typical for the region. One of the deep fractures in the valley is marked by Blagoevgrad thermal spring with a temperature of 55.1° and debit of about 620 litres per minute. The Bistrishki razlom has a typical radial direction from north-east to south-west, as it is followed in the upper current of the river. There are very pounded up and milled granite masses with width of up to 250 m. Some branches and breaks determine the relatively big valley extension in the region of Kartala area and Makedoniya hut.

The valley of Blagoevgradska Bistritsa is very interesting when it comes to geomorphological aspect. On the ridges of the Arizmanishki and Parangalishki part of Rila are preserved residues of very well expressed in the relief denudation flatness which can be seen at height of 2 300-2 600. 400-600 m below there are marks of another denudation surface with altitude of 1900-2200 m. On this surface there are spacious Alpine pastures. H. Lui and M. Glovnya proved that to a very large extent the examined denudation surface has advantaged the development of the glacial forms during the Pleistocene. Most of the circus bottoms, circus terraces and syncline valleys are cut in this flatness. Those which are less preserved are the marks of the third by age denudation surface 1 400-1 700 which can be followed in the region of the resort Bodrost in the area Karkama, near to Boli vrah and etc. In some places in the valley, as for example in the region of the forestry enterprise Dobro pole can be seen the residues of the forth by age denudation surface with altitude of 1 100-1 300 m. In the region of Bistritsa village and further on the west foot and slope of Rila, M. Glovnya described two foot areas, looking like stairs, with altitude of respectively 800-1 000 m and 500-700 m.

Maybe the most interesting relief forms which are met in the high areas of the valley of Blagoevgradska Bistritsa are the glacial forms. On the south slope of Mechi vrah it can be seen the circus from which during the Pleistocene the Bistrishki lednik derived from. As a result of its exaration activity it was formed the bed glacial valley of Blagoevgradska Bistritsa in the area from Mechi prohod in the west to the Cherna skala at 1750 m which is situated near to the mouth of the river Parangalitsa. Here Blagoevgradska Bistritsa runs through bottom moraines and sliding down from the slopes deluvial materials. Where is the Cherna skala in the bed valley there is a rock threshold – nagging piece. On it the river creates a swift current and a beautiful waterfall with a height of 6 m. It is believed that this threshold is lithologicly determined because on that place there is a massive pegmatitic ledge. Lower in the area Bivolarnika, in the valley are well preserved the three morainic swells – a residue of the side moraines of the Bistrishki lednik. Following the river current with altitude of 1 460-1 420 m it is reached a valley widening, covered with moraines and scree material. This is the famous Kartalska polyana – a place that is often visited by tourists. According to M. Glovnya this widening represents a typical morainic amphitheatre.

In a lot of places in the valley of Blagoevgradska Bistritsa the geomorphologists have found remains of river terraces. In the middle current there is a well preserved 16-meter terrace. For example the resort Bodrost occupies the plain of an 18-meter terrace which is best preserved on the left bank of the river. The buildings of the forestry enterprise Dobro pole are situated on a 28-meter terrace.

Most of the feeders of Blagoevgradska Bistritsa form very well expressed in the relief superficial cones. They are well developed after the mouth of the river Slavova and mainly in the dry valleys west from Bistritsa village.

Characteristics of the climate

Against the background of the general regularities of the climate which are described for the territory of the park "Rila" are formed a number of local peculiarities which are influenced by the physico-geographical elements of the given place, as some of the more important are – the relief with the incline, the altitude and the exposition, the character of the covering surface, the soils, the plants and the snow cover.

The thermal conditions of a specific place or region, in this case – the water catchment area of Blagoevgradska Bistritsa, are determined to a significant extent by the duration of the sun shining. Because of the increase of the cloudiness, on the slopes of the drainage basin of the river the duration of the sun shining will decrease. In Blagoevgrad /altitude of 410 m/ the duration is about 2150-2200 hours per year, while in the spring area of the river Golyam Mechi vrah /altitude of 2617 m/ it will be about 1 900-2 000 hours per year. The sun shining is least in December. This minimum is determined by the minimum for this time of the year duration of the day, not only the cloudiness which is highest during this month. From January onwards with the increase of the duration of the day, the sun shining continuously increase, too. That is how it is reached the maximum in its annual regime. It is not in June when it is the largest day, as it is in July – in the low parts of the drainage basin (altitude of up to 1 500 m) and in August (altitude of more than 2 000 m) when total cloudiness decreases. Here the typical characteristics for the high mountains are revealed – during the winter (January) the duration of the sun shining is higher with 10-25% than in the foot and plane parts of the river valley of Blagoevgradska Bistritsa. This is caused by the fact that the mountain slopes of the ridges Arizmanishko and Ravnishko, as well as the ridges themselves, remain more often out of the grounded thermal inversions, covering the low parts and the valley of Blagoevgradska Bistritsa.

When analysing the data concerning the average monthly temperatures of the air (table 1), it can be seen that they are lowest in January. This is connected with the found already minimum of the duration of the sun shining which is the reason for the negative for that time radiation balance, as well as with the active transmission of cold arctic and cold continental air masses of the temperate latitudes. Except for Blagoevgrad (altitude of 410 m) where these temperatures are positive 0.6°, in the height zones with altitude of more than 550-600 m the average January temperatures are negative.

In July in the foot and on the mountain slopes of South-West Rila whete the examined region is situated, the average temperatures reach their maximum, as with the increase of the altitude the maximum of the temperature changes gradually – it is late. In the station Blagoevgrad (altitude of 410 m) it is in July (22.0°), as with the increase of the altitude the maximum of the temperature changes and it is in August. If we use the data of Stoychev, Petrov, 1981 for the neighbouring stations

we can receive even a detailed picture of the climatic conditions on the west and south slopes of the mountain (Table 3-3).

Table 3-3: Average monthly temperatures of the air (according to Stoychev, Petrov, 1981) (for the period 1949-1968).

Station	Alt.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Av. year
Blagoevgrad	410	0.6	3.0	6.4	11.9	16.5	20.0	22.7	22.7	18.7	12.8	7.3	3.0	13.2
Rila	470	0.3	2.6	5.9	11.6	16.1	19.5	22.0	21.9	17.9	12.0	7.3	2.9	11.7
Rila Monastery	1140	-2.5	-1.3	1.5	5.9	10.5	13.5	15.4	15.2	11.9	7.7	3.6	-0.7	6.7
Semkovo	1570	-4.4	-2.9	-0.9	3.5	8.5	11.6	13.6	13.2	10.3	6.4	2.9	-1.7	5.0
Kalin dam	2390	-7.9	-7.0	-5.6	1.6	2.7	6.3	8.8	8.2	6.5	2.6	-1.8	-5.6	0.5

The distribution of the average annual temperatures also depends on the altitude. When examining and comparing the temperature values /from table 1/ we see that the average annual temperatures are higher than 10°C when the altitude is not more than 600 m. The temperatures gradually decrease below 5°C when it is passed the border of altitude of 1 500 m, until they become negative when the altitude is more than 2 450 m.

The average twenty-four-hour temperature amplitude is highest during the summer months and lowest during the winter. The leading role in the regime of the temperature amplitude has the astronomic factor but its influence is combined with the influence of the relief forms and of the characteristics of the atmospheric circulation.

Something that is of great importance for some physico-geographical processes (snow-retention, melting of snow, vegetation of plants and etc.) is the sustainable passing of the temperature more than some specified values 0; 5; 10°C. The passing of the average twenty-four-hour temperature below 0°C happens between the beginning of September – in the highest parts of the water catchment area (altitude of more than 2 000 m) and the beginning of December – in the foot and mountain parts. The period with negative temperatures continues until the middle of March in the lower parts of the examined region and until May-June for the higher and ridge parts of the water catchment area. Therefore, the average duration is between 3 months in the lower places and 8-9 months in the higher. During this period the vegetation of the plants stops, the precipitations accumulate in the form of snow cover on the water catchment area.

The sustainable passing of the temperature above 5°C starts from the middle of March until the middle of June, depending on the altitude. The period with temperatures higher than 5°C finishes from the middle of September until November. Its average duration is between 9 months in the foot (Blagoevgrad) and 2 months in the highest regions of the drainage basin. The sustainable passing of the temperature above 10°C starts from the beginning of April until the end of June, as the average dates for the end of this period are from the end of August (in the high parts) until the end of October (the foot of the mountain). The sums of the temperatures which are higher than 0; 5 and 10°C also depend on the altitude.

Cloudiness is one of the basic climatic elements which in the same time it is also a climatic factor. Blagoevgrad is the least cloudy when it comes to the average annual values of the cloudiness in the examined region - 4.7 forces. In the other parts of the water catchment area with higher altitude the average cloudiness is between 5.1-5.4 forces. The average annual number of gloomy days for this part of the country is between 80-100 days.

The regime of precipitations and their territorial distribution are of great importance for the regime of the flow, the water resources and the distribution of the plants. Only two stations are situated on the examined territory – Blagoevgrad and Dobro pole. That is why in the analysis we also rely on other, closely situated stations. The transitional precipitation regime predominates, as two minimums and two maximums of precipitations are typical for it. This is caused by the simultaneous influence of the Atlantic and Mediterranean cyclones during the respective seasons (Table 3-4).

Table 3-4: Average monthly distribution of precipitations on the west and south slopes of Rila (according to Stoychev, Petrov, 1981).

Station	Alt.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual sum
Blagoevgrad	410	45.8	38.5	39.4	51.2	61.4	**70.0**	35.9	*29.3*	30.2	40.1	68.0	46.4	**556**
Gradevo	446	72.4	50.3	53.9	62.9	74.9	79.4	36.7	*36.8*	39.8	49.2	**100.9**	72.5	**730**
Rila	470	46.7	39.7	37.2	54.8	61.0	**73.7**	36.8	*35.2*	36.6	43.3	65.9	51.9	**583**
Predel	1142	87.8	67.2	72.0	59.9	86.1	79.4	50.4	*42.4*	50.5	56.1	**88.2**	87.5	**827**
Dobro pole	1209	64.8	50.5	53.4	61.9	87.4	**95.0**	51.3	*38.6*	49.8	58.6	87.8	72.8	**772**
Semkovo	1570	70.4	55.1	66.6	80.0	133.6	**137.8**	97.0	66.4	61.8	52.1	77.6	63.0	**961**
Kalin dam	2390	65.0	*42.0*	64.0	56.7	82.0	**165.0**	91.0	84.0	61.0	119.0	107.0	68.0	**1004**

According to the averaged data of Stoychev, Petrov, 1981 (table 4) the maximum of precipitations is in June with secondarily, more weakly expressed maximum in November, as the difference in the altitude exercises its influence. The transitional character of the precipitation regime is also confirmed by the calculated 80-year period of the coefficient for continentally for Blagoevgrad station. Its value is a unit in even internal annual distribution of precipitations. The analysis shows that the values of K vary from 0.4 to more than 3.0 but the average value is about 1.0, as it is not changed during the examined period, i.e. we cannot speak about a change in the precipitation regime in the region for the last 80 years.

These peculiarities in the regime of precipitations are explained with the character of the atmospheric circulation. During the spring and in the beginning of the summer the maximum is caused by the transfer of unstable air masses from the Atlantic Ocean. The forced ascent of these unstable air masses on the west slopes of Rila which are against the wind (where the examined region is situated) is the reason for the heavy rains. Together with the Atlantic cyclones, of great importance for the collecting of high precipitation sums during the spring period are also the convective movements in the conditions of weakly gradient pressure fields, as well as the synoptical situation because the region belongs to the front parts of the anticyclonic ridge of the Azores. Upon the superheating of the unstable air masses in them originate powerful cumulus clouds from which

fall internal mass rainfalls which also assist the formation of the June precipitation maximum. During the autumn and the winter the precipitations on the south-west slopes of Rila are mainly connected with the passing and the frequency of the Mediterranean cyclones which influence on the secondary maximum, as when the climatic frontal zone is situated to the south of our country on the warm fronts and occlusions of the pushing in Mediterranean cyclones are created conditions for really heavy rains.

The minimum of precipitations is in August or the second half of the summer. The annual precipitation sum in the region increases with the increase of the altitude. This increase is uneven and it depends on a number of local conditions, as most of all it depends on the exposition of the slopes. According to the incomplete data that we have in respect of the station Parangalitsa (1500 m), for a period of ten years the annual precipitation sum is about 800 mm. This value is considerably smaller than the recent notions about the quantity of precipitations in Rila. It supports come concepts for the considerable decrease of precipitations in the high parts of our mountains for the last years (Velev, 2010). The approximate vertical pluviometric gradient is about 25 mm/ 100 m height.

If we present a table with the average seasonal distribution of precipitations in % (Table 3-5), it comes clear that their maximum quantity is reached during the spring and the minimum – during the summer. The droughts are one of the most important climatic phenomena connected with the regime of precipitations. As a meteorological term it is connected with the period of the long exceeding of the evaporation of precipitations and the very high temperatures of the air for the practical exhaustion of the reserves of dampness. It is typical for the examined region that every 3-4 years there is a drought which lasts 30 days (sometimes 40 days), as this usually happens in the end of August and the middle of September.

The snow cover is of climatic and economic importance. In the region it forms every year but it is stable (with continuous duration of more than 30 days) only in the higher areas of the drainage basin. The basic factors of the snow cover are the snowfalls and the temperatures of the air and the soils. In the examined region the snowfalls are about 20-40% of the annual precipitations (average value for the whole water catchment area). The first snow cover is usually seen at the same time in one vertical range from 500 to 1 000 or more meters height depending on the magnitude of the snowfall and the level of the temperature. That is why the dates of the first snow cover (table 6) show a specified vertical zonality depending on the altitude. In the highest parts (the dam Kalin) the first snow cover can be seen in the middle of October, for the middle mountain parts – the middle of November, as there are changes depending on the exposition of the slopes, for the low mountain parts – the third ten days of December. The last snow cover can be seen at the latest from the beginning of March to the middle of June depending on the altitude.

Table 3-5: Average date of the first and last snow cover (according to Stoychev, Petrov, 1981).

Station	Altitude	Average dates		Duration of the period with snow cover (in days)
		First snow cover	Last snow cover	
Blagoevgrad	410	21.12	29.02	70
Dobro pole	1209	20.11	03.04	152
Semkovo	1570	06.11	21.04	166
The dam Kalin	2390	17.10	19.06	245

The average annual number of the days with snow cover is least in the low parts: 18-20 days and it increases with the increase of the altitude to about 200 in the highest parts of the drainage basin. The duration of the snow cover is of importance for the hydrological regime, the ski sport and etc. While in the low regions of the drainage basin the snow cover does not last during the whole winter, in the middle mountain zone it lasts during the winter months, as in the high mountain regions it lasts until the middle of May.

The thickness of the snow cover is very changeable. It depends both on the strong winds with mainly west component and on the very different and rough high mountain relief. The snow is swept away from the open ridges and steep peaks, as it superimposes in the circus bottoms, the avalanche chutes and the glacial valleys. In the drainage basin of Blagoevgradska Bistritsa the thickness and the duration of the snow cover to a very large extent depend on the exposition of the slopes. The two macroslopes have respectively south and north exposition. That is why the snow cover melts considerably earlier (often 20-30 days) on the south slopes of the Arizmanishko bilo.

As it was mentioned, the winds depend on the atmospheric circulation and the peculiarities of the relief. The deep and narrow valley of Blagoevgradska Bistritsa reduces the speed of the wind and reorientated its direction in the direction of the river valley. The west winds predominate. During the warm half of the year a typical phenomenon is the obvious existence of mountain and valley winds which cool off the hot summer nights in Blagoevgrad.

3.1.2 Flora

Recently, the biological diversity of the Rila National park has been studied with reference to: 1) the implementation of the GEF Project for Biodiversity Conservation in Bulgaria (Sakalian, 2000); 2) the development of the Management Plan of the park for 2001 – 2010 (National Park “Rila”, 2001); 3) the development of the Management Plan of the park for 2015 – 2024.

The bryoflora in the Rila National park has been studied, summarized and analyzed by Ganeva (2000) and Nacheva & Ganeva (2016). The number of species recorded on the territory of the park has been 313, which is 42% of the total number of species in Bulgaria. The representatives of mosses (Bryophyta) are 227, and the liverworts (Marchantiophyta) are 86 species. They belong to 127 genera and 59 families (74% of the families in the country) (Nacheva & Ganeva, 2016).

Data about the species richness of vascular plants in the Rila National Park have been collected, summarized and analyzed by Penev et al. (2000) and Vladimirov et al. (2016). A total of 1 338 species of fern and seed plants belonging to 426 genera and 95 families have been recorded. This is about 32.6% of the species richness of these plants in Bulgaria, which characterizes the flora of the park as rich (Vladimirov et al., 2016).

The medicinal plants have been studied by Vitkova and Evstatieva (2000), and by Vitkova and Delcheva (2016). The updated list includes 398 species. They are representatives of 244 genera and 77 families. All medicinal plants reported for the territory of Rila National Park represent 55% of the medicinal plants listed in the application of the Medicinal Plants Act (2000). The medicinal plants represent 29.7% of the total number of plant species found in the Rila National Park (Vitkova and Delcheva, 2016).

A part of the Rila National park, including Parangalitsa Reserve, falls in the catchment basin of Blagoevgradska Bistritsa River (South-Western Rila Mt.). Information about the flora and vegetation of Parangalitsa Resere was published by Penev (1960a), Bojilova (1981), Penev (1968), Bondev et al. (1981), Nedyalkov and Nikolov (1986), Biserkov and Gussev (2015), Penev and Vladimirov (2015). Data about the vegetation characteristic and plant species in the catchment basin of Blagoevgradska Bistritsa River can be found in the publications of Penev (1960), Bondev (1991), Assyov and Petrova (2012), Biserkov and Gussev (2015), Penev and Vladimirov (2015), Vitkova and Delcheva (2016), Vladimirov et al. (2016).

The natural vegetation and the species composition of the plant communities have been changed as a result of differen human activities - felling forests, fires, grazing. A part of the catchment basin, deforested in the distant past, is occupied by secondary grasslands. Another part of the destroyed forest areas is occupied by natural secondary, low-productive degraded forests and shrubs. The primary grasslands in the sub-alpine and alpine belts (zones) have also been altered, mainly under the influence of pasture. In practice, secondary dominant and keystone plant species (occurring under the influence of man) along with the autochthonous ones occur in all altitude vegetation belts in the catchment area. Such species are *Carpinus orientalis* Mill. and *Juniperus oxycedrus* L. in the belt of the hilly plains and foothills, *Populus tremula* L. and *Juniperus communis* L. in the oak belt, the European white birch (*Betula pendula* Roth). in the beech Belt, *Chamaecytisus absinthioides* (Janka) Kuzm. in the coniferous belt, *Juniperus sibirica* Burgst., *Nardus stricta* L. and *Festuca valida* (Uechtr.) Penzes in the sub-alpine belt (Penev, 1960a).

The anthropogenic influence is registered even within Paranagalitsa Reserve. According to Bozhilova (1981), a certain decrease of the upper forest boundary around 1600 BC was caused by human influence, as the participation of anthropophytic elements (*Plantago lanceolata* L., *Rumex* spp., representatives of families Chenopodiaceae, Asteraceae, etc.) in the pollen spectrum from this period was clearly expressed. Secondary communities are formed in the coniferous belt - Scots pine (*Pinus sylvestris* L.) forests, shrubs of *Juniperus sibirica* Burgst., *Chamaecytisus absinthioides* (Janka) Kuzm. and herbaceous communities of *Festuca valida* (Uechtr.) Penzes. The changes are substantial

especially in the sub-alpine belt. There are shrub formations of *Juniperus sibirica* and *Chamaecytisus absinthioide* and grass formations of *Festuca valida* and *Nardus stricta* in place of the destroyed by burning Dwarf pine coenoses. Secondary formation of *Rumex alpinum* L. was formed in place of former dairies and cattle pens (Bondev et al., 1981). Probably, the last significant decrease in the populations of *Picea abies* (L.) Karsten. and *Abies alba* Miller., as well as the destruction of *Pinus mugo* Turra due to felling or burning of forests in order to provide areas for agriculture and grazing, refer to the Middle Ages (Bozhilova, 1981).

The species of flora (mainly vascular plants) that occur in the catchment basin of Blagoevgradska Bistritsa River are listed in ANNEX A.

3.1.3 Fauna

According to the updated Management Plan, in the territory of Rila National Park 4435 animal taxa (species and subspecies) have been registered (Rila National Park Management Plan, 2017). Of them, the invertebrates are 4186 taxa, the fishes – 11 species, the amphibians – 12, the reptiles – 20, the birds – 156, the mammals – 50 species.

As a result of a study of literary sources (Simeonov et al., 1990, Nakinov et al., 1997, Sakalian 2000, Peshevet al., 2004, Pulev & Sakelarieva 2009, 2011a, 2011b, 2013, Karapetkova & Zhivkov 2010, Golemanski 2015), as well as from own unpublished data, a total of 806 animal taxa have been established in the territory of Blagoevgradska Bistritsa river basin. The invertebrates are 632, the fishes – 6, the amphibians – 11, the reptiles – 21, the birds – 92, the mammals – 44 (see ANNEX B). Only one invertebrate species *Serratella maculocaudata* Ikonomov, 1961 which refers to a category CR – critically endangered, appears in the Red Data Book of Bulgaria (RDB). The ichthyofauna is also represented in the book by one protected species – *Oxynoemacheilus bureschi* (Drensky, 1928) (category VU-vulnerable). The reptiles have 2 (category EN – endangered), the birds – 26 (categories VU, EN, CR) and the mammals – 7 (categories VU, EN, CR) species. There are not species recorded in the Red Data Book of Bulgaria among the amphibians found in the territory of the Blagoevgradska Bistritsa river basin.

3.1.4 Other natural characteristics

3.1.4.1 General hydrological characteristics of the water resources on the territory of Rila National Park

The Rila National Park, which falls in the Rila-Pirin sub-area is characterized by temperate continental climate, significant snow-flowing of the river runoff, large watering capacity at high drainage coefficiente and high spring-summer peak with a maximum in May. Based on the average characteristics of hydrological areas, the annual runoff in the area is 1100 mm with a drainage factor of 80%. The average annual flow rate is 880 mm and varies, depending on the altitude, from 240 mm

to 1100 mm. Snow and underground feeding are significant and account for 45% and 42% of the total run-off. Rila National Park is situated in a high water catchment area, 76.5% of the annual flow is formed during the period of high waters. The low-water period is observed from December to February, with an annual minimum observed usually in February. River runoff is characterized by annual variability due to climatic factors and anthropogenic impacts.

The catchments of four large basins - Struma, Mesta, Iskar (the longest) and Maritsa (the largest) are formed on the territory of the Rila National Park. The management of the water resources in the Rila National Park is under the jurisdiction of three Basin Directorates - Danube, East Aegean and West Aegean. The density of the river network by archive information from the hydrological stations in the Rila National Park or near its borders varies from 0, 9 km / km^2 to 2.04 km / km^2 at an average of 1.65 km / km^2. The map of the territory of the Park with the main water bodies is presented in Fig. 3-1.

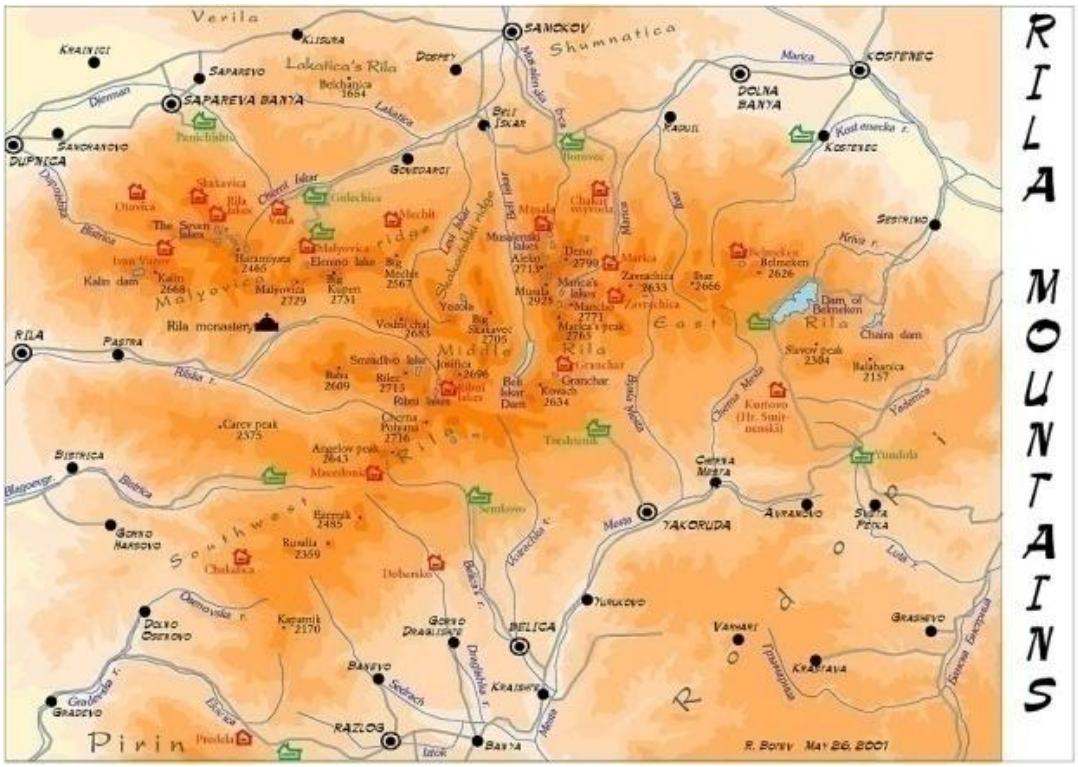


Figure 3-1: Map of the main water bodies located on the territory of Rila National Park (source: Rila Management plan).

Rivers running on the territory of Rila National Park

The main rivers and their larger tributaries flowing through the Rila National Park are presented in Table 3-6.

Table 3-6. Hydrological data and water status of the main rivers and larger tributaries running through the Rila National Park (according to Hristova, 2012; Rila management plan 2015-2024; Rilomanastirska Forest Reserve Management Plan 2015-2024; River Management plans of West Aegean, East Aegean and Danube region and data from the hydrological information of the National Institute of Meteorology and Hydrology, Bulgarian academy of sciences)

Name of Rivers	Hydrological data	Water status
Struma River catchment		
Osenovska	The longest tributary of the Gradevska River (L-19.0 km, F-88.0 km^2). Starts its flow from elevation 2354.2 m, the western slope of Kapatnik peak, Rila, with the name Rakovitsa (Rakochevska). After the village of Dolno Osenovo took the name Osenovska. Flows into the Gradevska River as its right tributary.	Osenovska River from springs to elevation 1310 m - good ecological and unknown chemical status.
Topilichka (Topalitsa)	Rises from the northern slope of peak Kopatnik (2169.8 m).The largest tributary of the river Gradevska River.	-
Gurgutitsa (Gurgutina)	Tributary of the Slavova River, which is a left tributary of the Blagoevgradska Bistritsa River.	-
Blagoevgradska Bistritsa	The left tributary of the Struma River (L-41.0 km, F-234.0 km^2). Rises from the southern slope of Golyam Mechi Peak (2617.4 m). The average annual runoff at the Slavovo village is 2.40 m^3 /s, and at the town of Blagoevgrad is 2.63 m^3/s.	Before the border of the Rila National Park, after the Parangalitsa Reserve (above the Bodrost-Kartala Ski Resort) – high ecological status Blagoevgradska Bistritsa River from the inflow of the Harsovska River to flow into the Struma River - bad ecological and unknown chemical status
Golyama Parangalitsa	Springs up north of peak Ezerik (2484.7 m). Runs to the northwest and flows into the left in the upper part of the Blagoevgradska Bistritsa River.	-
Malka Parangalitsa	The longest tributary of the Golyama Parangalitsa River. Drains from the northwest slope of Mount Parangalitsa (2419.9m) and flows into the lower stretches of the Golyama Parangalitsa.	-
Haydushka	Rises southwest from Parangalitsa peak (2419.9 m), running northwest. Upper, left tributary of Blagoevgradska Bistritsa River.	-
Kriviya uluk	Starts its current east of peak Ravnets (2409.2 m) and runs northwest. Left tributary of Blagoevgradska Bistritsa.	-

Zloto dere	Short, right tributary of Blagoevgradska Bistritsa River. Spring area - southwest of Gorna Kadiytsa peak (2342.8 m).	-
Kartalsko dere	Springs southwest from the peak of Dolna Kadiytsa (2367.4 m). Right tributary of Blagoevgradska Bistritsa River.	-
Kovachitsa	Starts its current from a spring on the northeast slope of peak Orela and flows southwest-west-southwest. Right tributary of Blagoevgradska Bistritsa River. Flows into the main river before the village of Bistritsa.	River Kovacitsa from the springs to elevation 800 m - good ecological and good chemical status.
Babkite	Springs from the southwest slope of peak Orela and joins to the middle part of the Kovachitsa River as its right inflow.	-
Argachka	Springs westerly from Musov peak (2260.5 m), flows southwest. Bottom right inflow of Kovachitsa River.	-
Bistritsa (Dupnishka Bistritsa)	Left tributary of Djerman River (L-23.0 km, F-57.0 km^2). Springs west of Vazov peak (2769.5 m). After the village of Bistritsa flows into the main river near town Dupnitsa.	Bistritsa River before the border of the park after drinking water catchment - high ecological status (Rila management plan). Bistritsa River from the springs to the elevation of 740 m - good ecological and good chemical status (Management plan West Aegean basin).
Bistrishka mala reka	The longest tributary of Bistritsa River. Starts its flow from the Polochite and flows northwest. Enters from the left of the Dupnitsa Bistritsa River after the Bistritsa waterfall.	-
Dzherman	Originates from the Seven Rila lakes, forming a river flow from two water streams flowing from the lakes Trilistnika and Ribnoto and joining to the Dolnoto Lake (L-23.0 km, F-57.0 km^2). It flows into the left in a river Struma, near the town of Boboshevo. The average annual flow of the river at Dupnitsa is 3.46 m^3/s.	River Djerman at the border of Rila National Park, after Lovna hut - moderate ecological status River Djerman with its left tributary Skakavitsa River to elevation 1052 m - good ecological and good chemical status.
Otovitsa	Springs east of Lake Otovitsa, runs northwest. Left tributary of the Dzherman River, which flows at town of Dupnitsa.	Otovitsa River at Hut Otovitsa, on the border of Rila National Park - high ecological status (Rila management plan). The Otovitsa River from the springs to the Dzherman River - good ecological and good

		chemical status (Management plan West Aegean basin).
Malata	Left tributary of the Otovitsa River.	-
Goritsa	Springs northwest from Kabul peak (2531.1 m). It flows like a left tributary of the Dzherman River in the region of the village of Resilovo.	River Goritsa from the springs to the elevation of 814 m - good ecological and good chemical status.
Fodunya	Emerges from the "Horses wells" at the northwest foot of peak Kamenna mandra (2162.6 m). Runs in a deep valley to the northwest, parallel to the Valyavitsa River. It flows into the Dzherman River as left tributary. The longest tributary of Fodunya River is Vodni dol River.	-
Valyavitsa	Springs north of peak Kamenna mandra (2162.6 m). It flows initially to the northeast, gradually orienting to the northwest. It flows in the Dzherman River lake a left tributary after the town of Sapareva Banya	-
Skakavitsa	Starts its current west of Lake Babreca, the Kabul part of the Northwest Rila, with the name Kabulska River. It runs north-northeast in a deep valley and forms the Skakavishkiya waterfall (70 m) - the highest in Rila. It flows like a left tributary into the Dzherman River.	Skakavitsa River at the border of Rila National Park, on the way to Pionerska hut -high ecological status and good chemical status.
Rilska	Originates from the Gorno Ribno lake (2200 m) with the name Kyorāvitsa, shortly after the spring area changes its name to Kriva River (L-51.0 km, F-390.0 km^2). Runs northwest through the steeply sloping valley and takes the name Manastirska. Steers his flow gradually to the southwest, passes through the Rilski manastiry and continues with the name Rilska River. After the town Rila has entered the field. After the village of Barakovo enters as a left tributary into Struma River. The area of the river in the village of Pastra is 222 km^2, and the average annual flow - 6.57 m^3/s	Rilska River at the tributary of the river of Vodnitsa – high ecological status. Rilska River from the influx of the Manastirska River and the Iliyna River to the River Struma - good ecological and unknown chemical status.
Iliyna	Starts its current from a spring north of Angelov peak (2641.3 m) from the Sinyoto Lake, which is situated between the peaks of Mermera, Zabtsite and Pavlev peak (L-16.0 km, F-88.0 km^2). Runs northwest-west. Infuses as a left tributary into the Rilska River. The average perennial natural water quantity at Brichibor for the period 1961 - 2002. is 2.23 m^3 / s.	The Iliyna River from the springs to the Rilska River - good ecological status and unknown chemical status.
Mesta River catchment		
Cherna Mesta	The river (L - 22.7 km, F - 159.6 km^2) starts its current	Cherna Mesta from the

	west of peak Belmeken (2626.4m). In the middle stream, the river takes the name Black Mesta. It flows of the left in the Mesta River, after the village of Cherna Mesta	springs to infuse into Mesta River – high ecological and good chemical status.
Sophan (Sophanitsa)	Springs southeast of the peak Ortachal (2569.8 m) (L-10.63 km, F-33.26 km^2). The average multiannual natural water quantity before infusion in the Cherna Mesta River for the period 1961 - 2002 is 1.33 m^3 / s.	The ecological status of the Sophan River in the section where crosses the park is defined as high.
Kardalitsa (Dautitsa)	The river (L-6.8km, F-10.4 km^2) runs from a spring west of peak Ortachal (2569.8 m). Right tributary of the Cherna Mesta River.	-
Leeveshtitsa	Springs northwest from the peak Ortachal (2569.8 m), (L- 8.9 km, F-16.5 km^2). The right tributary of Cherna Mesta River.	After the border of the park waters of the river are defined with high ecological status.
Bella Mesta	Starts its flow from the Ropalishkite Lakes. After the after the influx of its left tributary Kazanishka River (Gennemdere) continues under the name Bella Mesta. About 1.8 km southwest of the village Cherna Mesta, (941 m above sea level) the Bella Mesta River merges with the left running Cherna Mesta River and both together start the Mesta river. In the Mecha Dupka locality, Bella Mesta is 9.4 km long and F is 56.68 km^2.	Bella Mesta River before tributary Kazanishka River is determined with high ecological status.
Dzhebre	Rises east of Yakorudskite Lakes. It flows into the main river at town Yakoruda.	-
Ropalitsa	Starts its current from the Rapalishkite Lakes (the Granchar Lake). Initial influx of Bella Mesta River.	-
Votrachka	Starts its current from a spring northwest of Lopatashki peak (2530 m) (L-17.8km, F-68.2 km^2). The average perennial natural water quantity in the village of Belitsa for the period 1961 - 2002 is 0.74 m^3 / s. It flows into the Belishka River on the left side near the town of Belitsa.	-
Stankova	Springs of the river are southeast of peak Vapa (2527.7 m). Tributary of the Votrachka river.	-
Belishka	Flows out of Vapskite Lakes with the name Vapa (L-22.6 km, F-134.4 km^2). The average perennial natural water quantity at Belitsa for the period 1961 - 2002 is 1.38 m^3 / s. Infuses into the Mesta River on the right at the village of Kraishte.	Belishka River after the Semkovo locality - moderate ecological status.
Redzhepitsa	Springs south of the Dolnoto Lake (2335.4 m). Right tributary of Belishka River.	_
Dinkov dol	With its tributaries drains from the southern slopes of the Golyam Mechi peak and the southeastern of the Angelov peak. Right tributary of Belishka River.	Dinkov dol from the springs to its infusion - good ecological and good

		chemical status.
Doburska	Starts its current from peak Ezernik. The right tributary of the Draglishka River (which is left tributary of the Iztok river).	-
Banenska	Springs from the Yakorudski lakes (L 7-9 km, F-11.5 km^2). It inflows on the right of the Mesta River.	Banenska River above hut Treshtenik - good ecological status.
Iskar River catchment		
Cherni Iskar	The Cherni Iskar River originates from the Pond of cleanness, collecting its waters from the vast circus between Zeleni peak and Haramiyata Peak. Downstream accepts the name Pravi Iskar. At 1 047 m above sea level joins with the right running Beli Iskar River and two rivers form the Iskar River. In the village of Govedartsi L is 9.75 km and F - 43.87 km^2. The average perennial natural water quantity in the village of Govedartsi for the period 1961 - 2002 is 1.55 (m^3/ s)	The river within the park is characterized with high ecological and good chemical status
Urdina	The river springs up from the Dagma peak (2669.5 m), collects the waters of Urdini lakes. Right tributary of the Cherni Iskar River (L-10.2 km, F-15.6 km^2).	-
Malyovitsa	Starts its flowing from the Malyovishki lakes. Infuses into the Iskar River at the Gyulechitsa area (L- 8.6 km, F-10.4km^2).	-
Preka	Starts from the Strashnoto Lake (the group of Prekorechkite lakes). Right tributary of the Iskar River (L- 7.1km, F-11.2 km^2).	High ecological and good chemical status.
Sredna Preka	Stars its current above the Svinsko lake. It accepts from the right the waters of Dolna River and flows into the right of the River Preka.	-
Lopushnitsa	Springs from the northern slopes of peak Popova shapka (2687.8 m), (L- 8 km, F-13.9 km^2). Flows into the right of the Cherni Iskar River, before the village of Govedartsi.	High ecological and good chemical status.
Golyama Lopushnitsa	Runs out of the Zhultoto (Lopushko) lake. It flows into the right of the Lopushnitsa river in locality Nadaritsa.	-
Yuruchka (Yurushka)	Springs south of peak Mechit. Flows like a right tributary of the Cherni Iskar River near the village of Govedartsi.	-
Garkova (Garkovitsa)	Starts its current from the northern foot of peak Budechki kamak (2447.4 m). The right tributary of the Iskar River, which flows into the main river near the village of Govedartsi.	-
Milchinitsa	Very short right tributary of Cherni Iskar, which flows into the main river Iskar near the village of Govedartsi.	-
Saparev dol	Right tributary of the Milchinitsa River.	-
Beli Iskar	Springs up from the northern slopes of peak Skalets	The river before the village

	(Redzhepica, 2678 m) above the Kanarskoto Lake. Right tributary of the Iskar River, which flows into the main river near the village of Beli Iskar (L- 27.9 km, F - 90.7 km^2). The average perennial natural water quantity at the village of Beli Iskar for the period 1961 - 2002 is 7.35 (m^3 /s).	of Beli Iskar – high ecological and good chemical status.
Musalenska (Borovetska) Bistritsa	Runs out of the Musalenski lakes. Flows as a right tributary into the Iskar River near the town of Samokov (L-9.3 km, F-19.43 km^2). The average perennial natural water quantity at the village of Borovets for the period 1961 - 2002 is 0.47 (m^3 / s).	River immediately after the border of the park – high ecological and good chemical status.
Maritsa River catchment		
Maritsa	Starts its flow from alpine lakes in the Marishkiya Circus. Takes over 50 initial tributaries along the current. Infuses into the Aegean Sea near Aleksandrupolis. The catchment area is F - 96.68 km^2, F - 40.8 km^2. The average perennial natural water quantity in Raduil village for the period 1961 - 2002 is 2.09 (m^3/s).	The River after Maritsa hut, at elevation 1200 m above sea level - good ecological and unknown chemical status.
Ibar	The river is the tributary of the Golyam Ibar River, which springs northwest from the Sredni peak (2433.5 m). At elevation 1900 m L is 11 km and F - 26.6 km^2. It flows into the right of the Maritsa River at the village of Raduil.	Ibar River before the border of the park – high ecological and good chemical status.
Malak Ibar	Left tributary of Ibar River	-
Kostenetska (Stara, Chavcha)	The river (L-26.9 km, F-91.2 km2).starts its current southeastern of Ibar peak (2663.2 m) in Rila mountain. Flows into the right in the Maritsa River at the area of Momina Klisura.	The river before the border of the park – high ecological and unknown chemical status.
Shivarito dere	Right tributary of Kostenetska River.	-
Hhodzhovitsa	Right tributary of Kostenetska River.	-
Krayna	Right tributary of Kostenetska River.	-
Крива Kriva River (Sestrimska)	The river springs southwest from Slavov peak (2306.1 m). At the area Belmeken L is 7.12 km and F - 20 km^2. The right tributary of the Maritsa River. Fluxes into the main river in the village of Sestrimo.	River after the Belmeken Dam - good ecological and unknown chemical status
Merdzhanets	The river starts its flow from Sokolov peak (2349.5 m). Left tributary of the Kriva River, which flows into the upper part of the main river.	-
Hadzhidedeitsa	The river originates from the ridge of Stankov Balkan. Short right tributary of the Kriva River.	-
Chairska	The river springs southeast from Slavov Peak (2306.1 m). At the locality of Chaira, L of the river is 8.25 km and F - 20.5 km^2. Right tributary of the Kriva River, which inflows before the village of Sestrimo.	Good ecological and unknown chemical status.

According to the Bulgarian national typology, the rivers flowing on the territory of the Rila National Park refer to the alpine and mountain type in the Eco-regions 12-Pontian province and the Mountain type in Ecoregion 7-Eastern Balkans. Within the Rila National Park, due to the restrictive regime of anthropogenic activity, the waters in the rivers and the streams are characterized by high quality and non-polluted environment conditions. The ecological status of the waters within the park is defined as high or good, the chemical as good or unknown. It should be noted that the smaller rivers presented in Table 3-6 for which ecological status is not defined can be assessed as the status of the main river into which they flow (if the status of the main river is determined as high) or high/good (if the status of the main river is determined as good).

Lakes and reservoirs

More than 120 lakes are located in the Rila National Park. The majority of them are glacial, which are formed over the quaternary period in the alpine part of the Rila Mountain. They are located at an altitude of 2000-2500 m above sea level. Details of the morphometric parameters and the ecological status of the main lakes in the Park are presented in Table 3-7.

Table 3-7. Morphometric and ecological characteristics of the main lakes and dams (according to Rila management plan 2015-2024; Rilomanastirska Forest Reserve Management Plan 2015-2024; River Management plans of West Aegean, East Aegean and Danube region, 2016-2021 and data from the hydrological information of the National Institute of Meteorology and Hydrology, Bulgarian academy of sciences).

Lakes	**Altitude (m)**	**Area (ha)**	**Water volume (10^3 m^3)**	**Maximum depth (m)**	**State of lentic waters**
Iskar River catchment					
Gorno Chanakgyolsko Lake	2238	1.01	-	5.5	-
Urdino Lake 1	2375	0.86	16.0	4.7	-
Golyamo Elensko Lake	2472	1.35	2.0	5.0	High ecological state
Malko Elensko Lake	2462	0.15	1.5	2.2	High ecological state
Gorno Malyovishko Lake	2362	0.34	5.5	3.1	-
Strashnoto Lake	2408	1.44	-	2.0	High ecological state
Gorno	2345	2.7	-	4.0	-

Perkorechko Lake 1					
Yosola Lake	2132	3.88	-	7.0	High Ecological State
Dolno Prekorechko Lake	2315	-	-	1.56	High Ecological State
Kanarskoto Lake	2270	2.19	-	-	-
Zelenovrushko Lake 1	2423	0.47	-	-	-
Ledenoto Lake	2709	1.8	97	16.4	-
Musalensko Lake 1	2577	1.24	27.5	5.8	High ecological State
Alekovo Lake	2545	2.39	135.5	14.5	-
Karakashevo Lake	2391	2.62	80.5	6.6	High ecological State
Maritsa River catchment					
Gorno Marichino Lake	23.78	2.15	92.3	10.8	High ecological state
Tamno Marichino Lake	2556	0.81	-	-	-
Dolno Marichino Lake	2368	1.09	20	5.5	High ecological state
Studeno Marichino Lake	2402	0.12	-	-	-
Saragyolsko Lake 1	2296	0.80	-	-	-
Golyamo Ibarsko Lake	2345	0,35	-	-	-
Chemberliya	2295	0,34	-	-	-
Suhoto Lake	2475	0,95	-	-	-
Chelushko Lake	2407	0,75	-	-	-
Ravnichalsko	2224	2,14	-	-	-

Lake					
Mesta River catchment					
Granchar Lake 3	2185	3.67	31.0	1.8	High ecological state
Ropalishko Lake 1	2625	0,09	-	-	-
Kazanchalsko Lake1	2370	0,59	-	-	-
Ribno Lake	2191	2.87	70.0	4.5	Moderate Ecological state – permanent tourism impact
Martvo Lake	2292	4.27	274.0	16.5	-
Suhoto Lake	2040	2,19	-	-	-
Vapsko Lake 1	2268	2,62	-	-	-
Redzhepsko Lake 1	2415	0,22	-	-	High ecological state Good chemical state
Plitkoto Lake	2178	0,5	-	-	-
Struma River catchment					
Okoto Lake	2440	6.8	860.0	37.5	-
Babreka Lake	2282	8,5	1170,0	28,0	Moderate ecological state – permanent tourism impact
Bliznaka Lake	2243	9,1	590,0	27,5	Moderate ecological state – permanent tourism impact
Trilistnikovoto Lake	2216	2,6	54,0	6,5	Moderate ecological state – permanent tourism impact
Ribnoto Lake	2184	3,5	38,0	2,5	Moderate ecological state – permanent tourism impact
Sedmoto Lake	2095	5,9	240,0	11,0	-
Skakavitsa	2162	1,09	-	-	
Otovishko	2355	1,01	-	-	-

Lake					
Ashkilar Lake	2212	1,25	-	-	-
Gradinsko Lake 1	2280	0,19	-	-	-
Karagyol reservoir	2314	6,25	-	-	Good ecological potential Good chemical state
	Height of the v (m)	**Dead volume (m^3,10^6)**	**Useful/ Operative volume (m^3,10^6)**	**Maximal flood area (dekars ,10^6)**	**Ecological potential**
Beli Iskar reservoir	49,70	0,400	14,900	1,100	Maximal ecological potential
Belmeken Reservoir Белмекен (border with the park)	94,00	4,9000	146,600	4,531	-

The predominant part of the lakes located in the Rila National Park are characterized by ultra-oligotrophic and oligotrophic conditions. The ecological status of the water in the standing ecosystems is characterized as high or good and almost no anthropogenic influence. An exception is registered in the Seven Rila Lakes, which is the result of the increased tourism impact in the region. The ecological status of these lakes is defined as moderate. This is worse than the target set according to the requirements of the Water Framework Directive - "good ecological status". In order to improve the status of the waters in the Seven Rila lakes, specific measures have been taken aiming at improving the conditions, strengthening the control and conducting of events for enhancing the ecological culture of the tourists.

3.1.4.2 Studies on the waters of Blagoevgradska Bistritsa River

The Blagoevgradska Bistritsa River (L-41.0 km, F-234.0 km^2) is a left tributary of the trans-boundary Struma River. The river springs from the southern slope of Golyam Mechi Peak (2617.4 m). It runs to the west in a deep valley between the peaks of Gorna and Dolna Kadiytsa from the north and Parangalitsa and Ravnets from the south. The Blagoevgradska Bistritsa River orientates its middle course to the southwest and west and south of peak Kurutman. In its lower stretches the river forms an arc, convex to the north. It forms a water catchment pool with a relatively uniform width along the longitudinal river continuum. The average annual runoff in the Slavovo village is 2.40 m^3 / s, and in the town of Blagoevgrad is 2.63 m^3 / s.

The slopes of the catchment area of Blagoevgradska Bistritsa are steep, in some places very steep. The longitudinal slope of the river in the upper part of the stream is between 10 and 15%, at the downstream is more than 2-3%. Contemporarily, the river can be divided into three sections: the

upper one - from the springs to the inflow of the river Zli dol River (Figure 3-2); middle - from tributary of Zli dol to inflow of the Slavova - about 5.5% (Figure 3-3); down - after the Slavova River to the mouth (2.5%) (Figure 3-4).

Figure 3-2: Upper part of Blagoevgradska Bistritsa River.

The specific conditions of the Blagoevgradska Bistritsa River are complemented by steep tributaries. The right ones have a greater slope - between 17 and 27%. In the case of the left tributaries, the differences are bigger - for the Harsovska River about 7% and for the others - in the range of 11 to 17%.

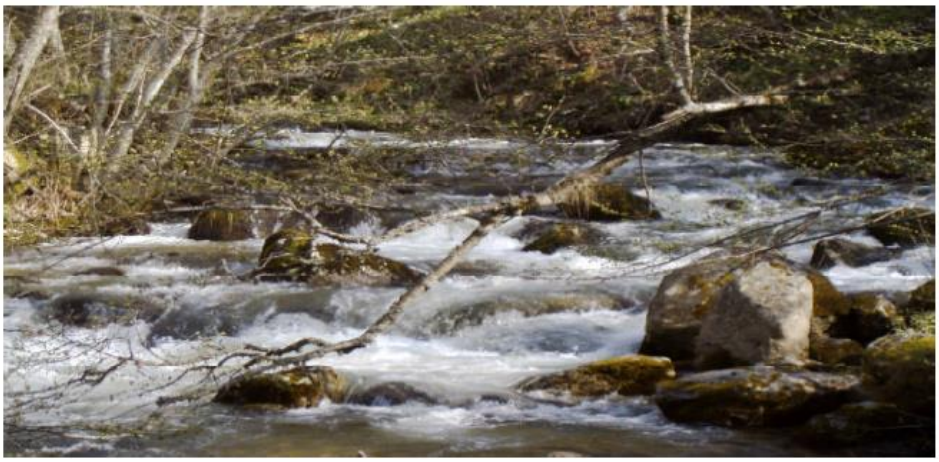


Figure 3-3: Middle flow of Blagoevgradska Bistritsa River.

Figure 3-4. Downstream of Blagoevgradska Bistritsa River.

The upper part of the catchment area of the Blagoevgradska Bistritsa River is located within the Rila National Park, where the river conditions are formed depending on the natural protected area between 1500 and 2400 m above sea level (Figure 3-5).

Figure 3-5: Part of the catchment area of the Blagoevgradska Bistritsa River, which enters in the boundaries of Rila National Park.

In the lower river stretches, the conditions are varied. The left tributaries in the basin of the Harsovska River - 31 km, are formed in the altitude 450-1300 m above sea level. In the right tributaries, the upper limit is much higher - up to 2000 m for the Kovachitsa River.

Several river orders can be defined for the catchment area of Blagoevgradska Bistritsa. A total of 259 stretches, ranging from the first to the fifth orders are determined. Of these, 204 are classified in the first order, 40 are second, 11 are third, 3 are fourth, and one is 5th.Blagoevgradska Bistritsa River is well studied in geomorphological (Lóczy, 2013), hydrological (Mihailov, 2005, Sakelarieva, 2006;

Sakelarieva et al., 2010), microbiological (Naumova, 1984; Naumova & Todorov, 1984), physico-chemical (Sakelarieva & 2006) and hydrobiological (Uzunov & Nachev, 1984; Stoychev & Chemev, 2001; Sakelarieva & Yaneva, 2007; Sakelarieva & Yaneva, 2009; Sakelarieva et al., 2008; Sakelarieva et al. , 2011) aspects.

The status of the river water is analyzed by Sakelarieva (2006) and Sakelarieva & Varadinova (2013) as well as in the studies dedicated to the development of Rila National Park management plans and the West Aegean Basin Management Plan (2016-2021). On the basis of the studies conducted, the ecological status of the Blagoevgrad Bistritsa River can be characterized as follows:
1. Before the border with Rila National Park, after the Parangalitsa Reserve (above Bodrost-Kartala Ski Resort) – high ecological status;
2. From the inflow of the Dinovo gullet to the flow of the Slavova river - good ecological and good chemical status
3. From the inflow of the Slavova River to the tributary the Hursovska River - good ecological and good chemical status;
4. From the influx of the Hursovska River until it flows into the Struma river - bad ecological and unknown chemical status.

In order to overcome the negative impact on the river ecosystems and reach the target "good ecological status", specific measures are laid down in the River basin management plan (see West Aegean River Basin Management Plan). Actions have been taken mainly to: Control of the quantity and quality of the industrial waste water discharged into the sewerage systems of the settlements.Rila National Park is situated in one of the richest of the water resources areas on the territory of the Bulgaria, which is a prerequisite for a good water supply of the region and the adjacent settlements. River runoff is characterized by annual variability due to climatic factors and anthropogenic impacts. The most serious disturbances of the river flow in the area of Rila National Park are connected with water use for hydropower and drinking water supply. This may deteriorate the ecological status of the water ecosystems and lead to the drastically reducing of water quantities of the certain stretches even beyond the park boundaries.

The surface waters in the National Park are characterized by high and good ecological status. The deterioration of the quality of the waters in the rivers and lakes is a result of local sources of impact. Pollution is mainly due to the waste waters. They come into the environment from the chalets and have a negative impact especially on the lentic ecosystems. That strengthens the processes of eutrophication and saprobization, which leads to the disappearance/substitution of species, the loss of high mountain biodiversity in some unique and still poorly studied aquatic ecosystems in the National park Rila. Studies conducted in connection with the development of the new Park Management Plan show that the small isolated populations of hydrobionts of the relict type are highly vulnerable. Another source of water pollution is due to the adverse impact of the of the increased tourist flow and insufficient ecological consciousness and responsibility. It should be noted that there are positive trends in the generation of solid waste in the Park, which is now considerably improved compared to 10 years ago.

3.1.4.3 Characteristics of forests and forestry sector in the catchment area of Blagoevgrad Bistritsa river and Rila National Park

Role and Importance of Forests in the Economy of Blagoevgrad Municipality

Forests have an important economic, ecological and social significance for Blagoevgrad Municipality. This is determined by the high percentage of wooded area on its territory (42.2%) and the factors related to the development of forest ecosystems - geographical location, soils, relief and climate.

Outside the boundaries of Rila National Park only the forests managed by Blagoevgrad Forestry are of economic significance. It is related to the ensuring of employment, extraction of timber, harvesting of herbs, mushrooms and berries, hunting and fishing, grazing of cattle and small livestock and others. The greatest economic effect possesses the extraction of wood materials. As a result of the constantly increasing demand for wood for different needs, from construction to production of cellulose, the state forestry manages to deal with the sale of the timber materials. For the last ten-year revision period from 2001 to 2010 the total timber harvested is 161 513 m^3 (Blagoevgrad State Forestry, 2011). The local importance of forests is mainly in supplying the population with firewood and, to a lesser extent, supplying the few small-scale woodworking enterprises.

Due to the high percentage of forest coverage in the territories of Blagoevgrad Municipality and Rila National Park, the ecological functions of forest ecosystems, in ways of medium-forming, water-regulating, soil protection, air-purifying etc., extend far beyond its borders. With the economic development of Bulgaria, the social significance of the forest territories in the municipality is growing, as they are a natural place for recreation and tourism and others.

Today is necessary to combine in a most appropriate way the economic activity in the forests with their preservation and improvement of their ecological and social functions. Despite the exceptional variety of forest types and physico-geographic conditions in the Blagoevgrad Bistrica river, the current level of forestry development can provide the specific and precise prescriptions for the types of economic activities, the most appropriate technologies for their implementation and the extent of use. This allows for a balanced approach in terms of economy and ecology, consistent with the principles of sustainable management and use of forest resources.

Characterization of forests in the Blagoevgrad Bistrita river basin and anthropogenic activities carried out in them

The characteristics of the forests in the catchment area of Blagoevgrad Bistritsa river in the report are based on empirical data from the taxological descriptions of the subdivisions, which are included in the forestry plan of Blagoevgrad State Forestry (2011), provided by the Directorate of the Commercial Enterprise " Blagoevgrad State Forestry". Field exploratory work on this report has been carried out between July and November 2010. Generalizations of the primary data and their analysis are done by the author. Succesion processes in forest ecosystems have an extremely slow pace и and

basing on a data from a shorter than ten-year period has no significant impact on aggregate estimates and revealed trends.

For convenient management and proper implementation of the projected activities in the forests, the territory of Blagoevgrad State Forestry is divided into four forestry sections. The forests in the catchment area of Blagoevgrad Bistritsa river fall entirely within the boundaries of two of them – "Dobro pole" and "Blagoevgrad". The "Dobro Pole" forestry section is located on the right bank of the river and the other on the left one. Their **total area** is 13 138.5 ha (Table 3-8). Of this, the non-productive area is 490.3 ha (3.7%), and its total share with the barrens is 6.3%. These are areas on which there is no possibility to develop forest cover, such as rivers, roads, buildings, precipice terrains, slopes etc. More than two-thirds of them belong to Blagoevgrad forestry section. This is primarily due to the better developed road network. Compared to the total share of the non-productive area and the barrens in the Rila National Park (18.4%), there is a 12.1% higher density of the forest cover. This indicator is necessary to be mentioned because of the great difference in the forest cover of the terrains in the catchment area of the Blagoevgrad Bistritsa river until just 60 years ago, when the territories around Blagoevgrad and in the higher parts were treeless. As a result of the massive afforestation during the period 1957-1970, and subsequent one with less intensity over 2 300 ha of new forests were created for the whole forestry (Blagoevgrad State Forestry, 2011).

Table 3-8: Statistical data on the area of the forest fund and its distribution by type of territory in the catchment area of Blagoevgrad Bistritsa river in ha, 2011

Forestry section	Total area	Wood-productive area			Non-wood-productive area
		Wooded area	Barrens	Total	
1	2	3	4	5	6
„Dobro pole“	5829.3	5467.5	205.6	5673.1	156.2
„Blagoevgrad“	7309.2	6846.8	128.3	6975.1	334.1
Total	13138.5	12314.3	333.9	12648.2	490.3

The area of forests in the catchment area of Blagoevgrad Bistritsa river, which are managed by Blagoevgrad state forestry is 12 314.3 ha (97.4% of the wood-producing area). The two forest sections differ in area by 1 379.3 ha (20.1%), despite almost double the larger geographical area on the left bank of the Blagoevgrad Bistritsa river. The reason for this is the large fragmentation of the forest cover with agricultural areas - fields, meadows, pastures, etc.

The wooded area in the catchment of the Blagoevgrad Bistritsa river is divided into forests with economic functions and forests with protective and special functions. Their ratio is respectively 4 272.1 ha (34.7%) compared to 8 042.2 ha (65.3%). The proportion of forests with a limited degree of use is almost twice as large and this ensures good prospects for the development of forest ecosystems. The reason for this increase is the introduction of new protected forests and the inclusion of large areas in NATURA 2000 protected areas under the Protected Areas Act.

The average slope of the terrain in the wooded area is 23 degrees. By this indicator, the forests managed by Blagoevgrad state forestry have a more favorable characteristic compared to the forests on the territories of Rila National Park. It was calculated on the basis of the 3 248 subdivisions of 176 departments within the boundaries of the two forestry sections, which makes an average area of one subdivision of 3.8 ha. The large number of subdivisions is due to the considerable diversity of tree species, habitats, altitudes, soil fertility, exposure, etc. This complicates greatly the forest management activities - choosing the type of logging, building and maintaining a road network, raising and protection of the forest, etc. The predominant expositions of the terrains are with southern, northern and western component.

The average altitude of forests in the catchment area of Blagoevgrad Bistritsa River is 900 m. This is two times lower than the altitudinal range of forests in Rila National Park. It predetermines the wide variety of economic classes (17) in the forests with economic functions and types of forests (5) with protective and special functions. this predetermines the wide variety of economic classes (17) in the forests with economic functions and types of forests (5) with protective and special functions.

The ratio in area between coniferous and deciduous forests is 45.7% compared to 54.3%. Despite the massive afforestation in the past mainly with conifers, this has not led to prevail over deciduous trees. The origin of forests is mainly seeded - 75.8%. Of course, the presence of a large, as an absolute value, area of 2 980.0 ha on the coppice forests for conversion into seedlings speaks of low productivity and poor ecological functions of forest ecosystems. This problem is also found in a large part of the forests of seed origin due to the presence of trees of coppice origin in their composition.
The main tree species occurring in the catchment area of the Blagoevgrad Bistritsa river, forming the species composition and participating with more than 10% in it, are:

- Conifers - Scots pine (*Pinus sylvestris*), plain spruce (*Picea abies*), black pine (*Pinus nigra*), silver fir (*Abies alba*) and douglas fir (*Pseudotsuga menziesii*);
- Deciduous - plain beech (*Fagus sylvatica*), sessile oak (*Quercus petraea*), Hungarian oak (*Quercus frainetto*), pubescent oak (*Quercus pubescens*), Oriental hornbeam (*Carpinus orientalis*), Eurasian aspen (*Populus tremula*), black locust (*Robinia pseudoacacia*), European hop-hornbeam (*Ostrya carpinifolia*), manna ash (*Fraxinus ornus*), silver birch (*Betula pendula*), common hornbeam (*Carpinus betulus*) and poplars (Populus).

The remaining tree species are concomitant and of great ecological importance, but practically have no economic significance. Some of them form a small number of small plantations with a larger share in the composition, but even their total area is insignificant and also do not represent economic interest. As such may be mentioned the artificial plantations of Atlas cedar (Cedrus atlantica) and larch (Larix), which are not natural to the area and even one of them belongs to another biogeographical region.

The management of forest ecosystems is an extremely complex process from a forestry point of view. On the one hand, it is necessary to achieve a balance between economic benefits and the ecological functions of forest ecosystems and on the other - the unification of technologies for the

exploitation of forests in their great diversity (geographic, climatic, soil, biotic, ecological, etc.). This unification is achieved by combining the different types of forests in economic classes specifically for each administrative or functionally defined territory. Economic activities in each class are subject to the general principles pursuing common goals. This facilitates both the achievement of objectives and in controlling the implementation of each activity. For the purposes of the survey, the economic classes and the groups of forests with special functions have been additionally unified for the forests in the Blagoevgrad Bistritsa River catchment according to the size of their quantitative indicators - area and stock. They are listed in Table 3-9.

Table 3-9: Statistical data on the area and the tree stock of economic classes and forests with special functions in the catchment area of the Blagoevgrad Bistritsa river (state forests)

Economic classes and groups of forests with special functions	**Area in ha**	**Stock in cubic meters**
White-piny	1135.8	264775
Spruce	211.3	75630
Black-piny	139.7	30225
Coniferous crops	174.0	27370
Coniferous-deciduous	96.2	32920
Beechen	591.0	185960
Oaken	137.1	11480
Deciduous	275.0	43980
Mixed, beech, sessile oak and Hungarian oak for conversion	1287.7	149875
Black locust and Oriental hornbeam	224.3	5275
Coniferous	3868.5	947275
Deciduous high-stemmed	1057.0	251780
For conversion and low-stemmed	2229.9	120430
Poplars	31.4	2322
Total	**11458.9**	**2149292**

What is interesting is the large proportion of forests for conversion into seed forests and the low-stem forests compared to the total area - 30.7% (3517.6 ha). These are forests with exceptionally low silvicultural performance, productivity and ecological functions. Practically 1/3 of the forests in the catchment area of Blagoevgrad Bistritsa river are residues of devastating use in the near and distant past and they rank first, as a priority in forestry activities. Evidence of low economic value and environmental functions is their average volume of wood growing stock of 1 hectare - 76.8 cubic meters. These are mainly devastated terrains with oak forests of coppice origin, which explains largely the low stock. Calculations of the stock of one hectare forest of economic class oak, which is of seed origin, also shows a low value - 83.7 cubic meters. This predetermines an exceptionally long period, in some cases hundreds of years, of limited use and the carrying out of significant by types and volumes of forestry activities in order to achieve the optimal indicators of forests characteristic of these habitats. Complementing this picture is the average wood stock of Black locust and Oriental hornbeam economic classes - 23.5 cubic meters.

Characteristics of forests in the Rila National Park and anthropogenic activities carried out in them

The characteristics of forests on the territory of Rila National Park are based on data from the Rila National Park Management Plan (2015) and the "Forests" miscellany from the Updated Rila National Park Management Plan (2015), provided by the Directorate of "Rila National Park". The data is summarized and analyzed by the author of this report.

At the last inventory (2015) on the territory of Rila National Park the measured area of the forest fund is 56 005.5 ha. This makes a share of the total area (78 040.6 ha) of the National Park amounting to 71.76%. Large part of this area falls into four reserves – Parangalitsa, Central Rila Reserve, Skakavitsa and Ibar, which are protected areas with a strict security regime. Their total area is 16 232.5 ha, of which 9 825.8 ha are wooded area with a wood stock of 1 122 115 cubic meters.

The forest fund includes two types of territories - wood-productive and non-wood-productive. Their quantity is indicated in Table 3 and in shares, compared to the area of the park, makes up respectively - 58.59% and 13.17%. The wood-productive area includes the areas occupied by forests, mountain pine (*Pinus mugo*) and non-forested area for wood production (barrens). In recent years, as a result of self-afforestation, the barrens have drastically decreased to only 10.6 ha.

The mountain pine has exceptional ecological functions and is therefore under a special regime of protection prohibiting its felling. From Table 3-10 it is evident that for the period from 1999 to 2015 its area has increased by 1 550 ha, which makes up a 10.0% increase. Despite the almost twice the area of the mountain pine, compared to the forests, the increase is practically the same. This shows the significantly more pronounced conquering nature of this species, although it is located in areas with extreme natural conditions. This is a high rate of succesion processes on high altitude terrains, which speaks of favorable climatic characteristics.

The main interest is focused on the territories covered by forests, which are situated on 36.91% of the area of Rila National Park. The reason for the size of this share, compared to other areas of the park, is the strategy during the marking of its borders, which was aimed at the inclusion of sections of Rila Mountain with a higher altitude. This is dictated by the aspiration to include to the territory of the national park sections of the mountain with minimal anthropogenic influence. Despite the relatively small share, their ecological importance is immense. These forests form the upper boundary of the forest in Rila mountain and their environment-forming, soil protective, water supplying and other functions under these extreme climatic conditions are exceptionally valuable.

During the last inspectoral period (2015), the wooded area (forests and dregs) has increased by 3 154.4 ha, due to more precise mapping, re-categorization of part of the former unsuitable areas and new forests on meadows, bare areas, alpine meadows and pastures. Table 17 shows a reduction of 629.9 ha of the area of the barrens and non-wood-productive areas on account of the wooded areas. Considering that the non-wood-productive areas consist mainly of rocks, swamps, rivers, roads, slopes, which are terrains without the possibility of developing forests or mountain pines, the

increase of afforested areas has affected to a large extent the meadows. This raises the question of how and to what extent the increase in afforested area has had an impact on the biodiversity of the Park.

Table 3-10: Statistics on the area of the forest fund and its distribution by type of territories in the Rila National Park in ha, 2015

Year of data from the inspectoral period	Area of the forest fund					
	Total area	Wood-productive area				Non-wood-productive area
		Wooded area		Barrens	Total	
		forests	mountain pine			
1	2	3	4	5	6	7
1999	53481.0	27201.1	15359.5	319.4	42880.0	10601.0
2015	56005.5	28805.6	16909.4	10.6	45725.6	10279.9
Difference	+2524.5	+1604.5	+1549.9	-308.8	+2845.6	-321.1

The prevailing slopes of the terrain in the forest areas are very steep and steep (30^{o}÷50^{o}). Their total share is 88.9%. This demonstrates their great sensitivity to extreme natural phenomena and anthropogenic impact and their outstanding anti-erosion and water preserving importance.

The exposure of the terrain is of great importance for the forest productivity and the development of its forestry indicators. For the latitude in which the Rila National Park lies, the forests with northern component and shady character have the highest productivity and ecological effect. The location of the park, which is in the middle of the mountain and covers all the high parts, includes all types of terrain exposures. Their analysis shows a significant predominance of exhibitions with northern component (north, northeast and northwest) compared to the southern (southeast and southwest), respectively: 49.1% to 26.2%. This, together with the 62.2% share of forests with a shadowy component of exposure, is a prerequisite for good microclimatic conditions, high potential for development and good values for the quality of forests.

The average altitude of the wooded area of the park is 1880 m. This falls into the subbelt of the upper mountain spruce forests, and this implies very good conditions for the development of coniferous species (Rila National Park, 2015, “Forests” miscellany). Fig. 3-6 clearly shows the alpine character of the forests in the park - 88% of the wooded area is located at altitude of above 1 500 m.

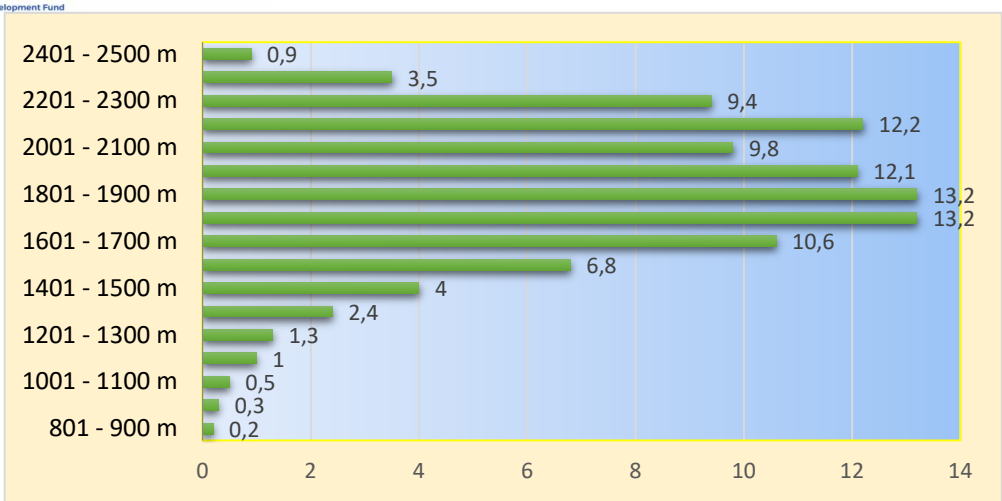


Figure 3-6: Distribution of forests by altitude in % (Rila National Park, 2015).

The forests in Rila National Park are predominantly of natural origin – of seeds and coppices. The forest of artificial origin, at the last inventory (2015), decreased in area from 2 235.3 ha to 1 839.6 ha. This makes up 17.7% and is the result of the suppression of some artificially created crops by the region's typical vegetation. This is understandable for afforestation with tree species that are typical for other biogeographical subregions. Of particular interest is the often observable displacement of the artificially afforested tree species with the identical one. This proves the necessity, when defining the type of afforestation to take into account not only the biogeographical characteristics of the area but also the use of propagating material produced from seeds harvested in the same region.

The variety of tree species is predetermined by the high average altitude on the territory of Rila National Park. Within the boundaries of the park a total of 26 tree species are observed – 8 coniferous (spruce, Scots pine, fir, Balkan pine /*Pinus peuce*/, black pine, douglas fir and larch) and 18 deciduous (with the greatest participation of - plain beech, sessile oak, Eurasian aspen, Oriental hornbeam and silver birch). On an average basis, 95% of them are conifers, both by area and by wood stock. Due to their natural origin, almost two-thirds of the forests consist of mixed tree aggregates (60,6%) – mainly mixed coniferous and mixed coniferous with deciduous tree species.

Fig. 3-7 shows the main tree species and types of forests which form the forest cover of the park. The basic participation of coniferous species in forests by area and by stock is clearly demonstrated. The average bonity of the tree aggregates in the park is III (2.9). This is a relatively high bonity for forests located at high altitude and on predominantly poor habitats, which occupy 46.2% of the wood-producing area. It is mainly due to coniferous species – spruce (2,7), silver fir (2,7), Balkan pine (2,8) и Scots pine (3,2). The total share of forests of IV and V bonity is 22.5%. Due to the non-profit character of the territories within the Rila National Park, no average height and no average diameter of the tree aggregates have been reported.

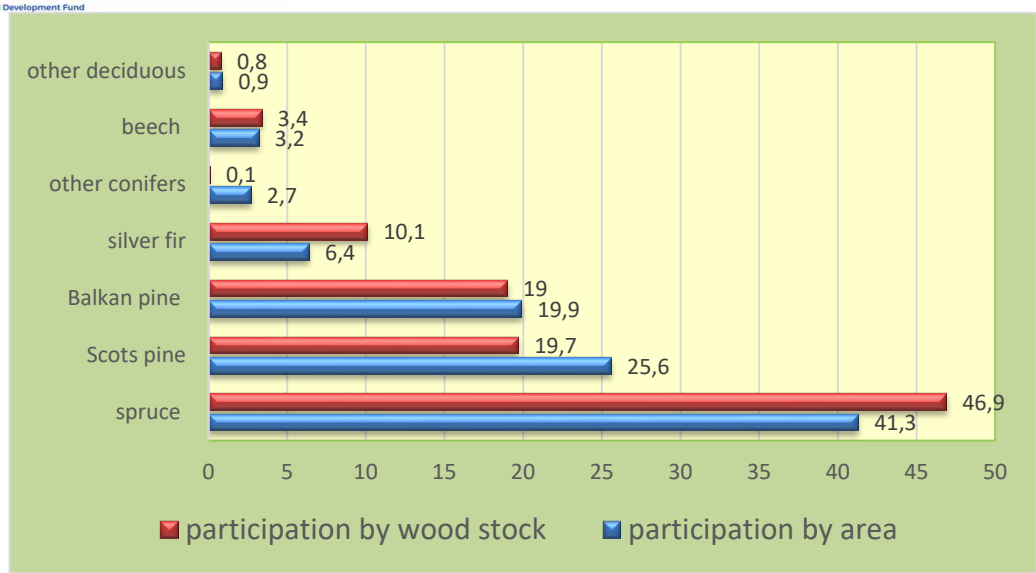


Figure 3-7: Distribution of tree species in % (Rila National Park, 2015).

The average age of the forests in the park is 107 years. This is 17 years higher than the previous inventory and proves the high level of protection of the national park. The main reason for this high age is the high altitude, the remoteness of settlements and the difficult access due to the steep and very steep terrains, which has limited the use of these forests before and after the announcement of the national park. The share of forests over the age of 100 years is 57.9%. The highest are the average ages of the silver fir (113), the spruce (112), the beech (109) and the Balkan pine (108).

At the last inventory of forests in the park their average density is 0.63 and an increase of 0.3 was established. Reversing this indicator in a positive direction is a slow process and this value indicates a high rate of development of forest ecosystems. From the forestry point of view this leads to an increase in the wood stock of the plantations and from the ecological point of view - to enhancing their environmental functions (defined for the Park as special functions).

The greatest increase is in the average density of the oldest forests (over 140 years) - 0.5. However, they make up this increase from a low initial value (0.49), which indicates the accumulation of biomass predominantly in the branches and a lesser influence on the other important forestry indicators, such as: height, average diameter, thinning the trunk of the trees in height etc. This means less impact on the ecological functions of forest ecosystems. It is very important to note that this high rate of development of density for this class of age speaks of the high biological potential of tree species (mainly conifers), which should be taken into account by forestry specialists and to recalculate their cycle of cultivation for logging, designated for forests outside protected areas.

The total wood stock of the forests in Rila National Park with branches is 10 310 000 cubic meters, and without branches - 8 888 800 cubic meters. This wood stock compared to the total forested area is relatively small. The reason for this are the climatic characteristics of the high altitude and the large share of mountain pine formations in the total wooded area, which has not been accounted for

wood stock. The shareholding in this stock (excluding branches) of the major tree species is accordingly: spruce – 46.9%; Scots pine –19.7%; Balkan pine – 19.0%; silver fir – 10.1% and beech – 3.4%.

Fig. 3-8 clearly shows the concentration of wood stock in the three biggest age classes - VI, VII and VIII. It does not include age class I (up to 20 years) due to its negligible share in the total stock - 0.1%. The total share of the three classes of age in the stock (with branches) is 67.3% (6 938 630 cubic meters), making over 2/3 of the total wood stock. Although their share in area is 57.9%, it is 10 points higher by stock.

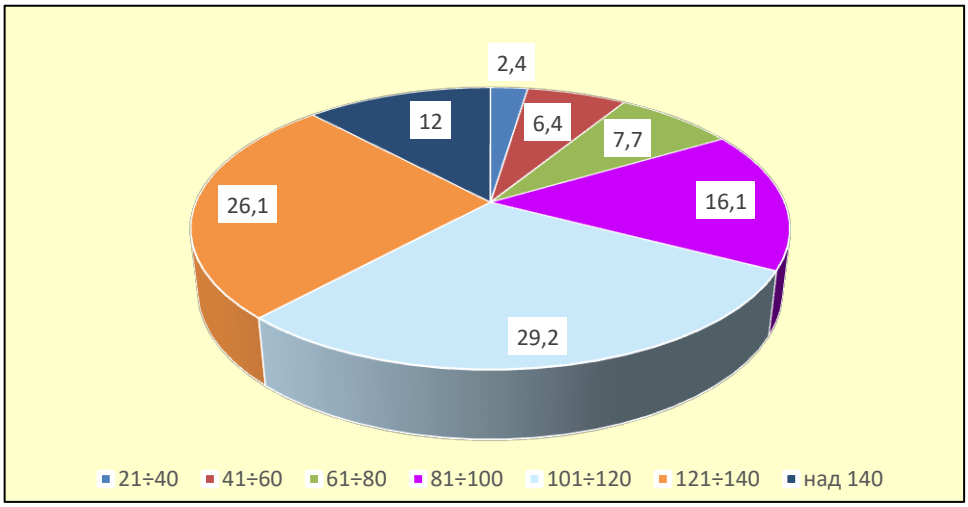


Figure 3-8: Distribution of wood stock (with branches) by age classes in % (Rila National Park, 2015)

The division of forest areas into the Park by functions includes reserves (9 825.8 ha of wooded area) and territories with the status of a national park (35 889.2 ha of afforested area). The size of the wood stock (with branches) in them is respectively - 1 122 115 cubic meters compared to 9 187 965 cubic meters. This makes a stock of 1 hectare respectively - 114 cubic meters compared to 256 cubic meters. It represents more than 2 times bigger wood stock in the park territories outside the reserves. The area of the mountain pine in the reserve territories is 7 027.2 ha and in the territories with the status of a national park - 9 882.2 ha, besides, there is no wood stock calculated on it. The average wood stock per hectare is 309 cubic meters.

When recalculating the wood stock per 1 ha totally in the four reserves based only on forests (2 798.6 ha), the average of 401 cubic meters per ha are obtained. For the forests (26 007,0 ha) on the territories with the status of a national park - it is respectively 353 cubic meters. If we accept the 1 hectare reserve as one of the main criteria for ecosystem potential, these recalculated values testify to equality of forests from the reserve territories and from the territories with the status of a national park. The difference of 12.0% in favor of the reserve territories is insignificant, even more when we consider their better location on territories with predominantly shady component and rich soils. Considering the ecological problems of the Parangalitsa Reserve, which result in the loss of part

of the forests and the decrease of their wood stock, this does not have a significant impact on the average forest wood stock from the total area of the reserves. From the above-mentioned can be concluded that the forests on the territories with the status of a national park have the same representative value as the forests in the reserves. This once again confirms the need to impose the modern approach of nonequilibrium perspective in the management of protected areas and biodiversity protection.

One of the most accurate indicators of the quality and potential of forests is the average annual growth of wood mass. It provides a comprehensive picture of the extent of absorption of solar radiation in a given territory. The average growth of 1 hectare of the forested area in Rila National Park is 3.11 cubic meters, which makes 89 265 cubic meters of average annual growth from the entire forest area. At the last inventory of the Park territories, an increase of 0.33 cubic meters per 1 hectare was observed compared to the previous one. Regardless of the observed increase, on this indicator the forests in Rila National Park and in Bulgaria still have values of more than 2 times below the values of identical forests in mountains from other geographic regions of Europe.

The ecological status of forests has been investigated by a team of specialists by an order of the Minister of Environment and Waters for the development of an Updated Management Plan of Rila National Park. The following topics are among the ones formulated for development in the assignment: „Systematization of accumulated data and creation of possibilities for development of monitoring programs for assessment of the status of species populations and natural habitats“ and „Recognizing existing and potential threats and measures for their limitation and elimination “. The scope of these topics include an analysis of the health status of forests, the development and trends of succession processes (growth and productivity of dendrocenoses; dynamics of structural parameters), impact of climatic changes and forests development forecasts. A dendrochronological analysis of the major tree species was carried out – plain spruce, Scots pine, silver fir.

The main conclusions of this survey on the ecological status of forests in Rila National Park are:

- The forest ecosystems in the Rila National Park are sustainable;
- The overall sanitary status of the forests in the park is very good (97.9% of the plantations have no damage);
- The forecasts for climatic changes in southern Europe (high temperatures, more droughts and strong winds) are expected to increase the occurrence of damage by wind throws, wind fractures, fire, calamities, fungal pathogens, etc.
- The Parangalitsa Reserve is a unique natural site for Europe by the indicator big-dimensionality of trees and overall productivity of whole tree aggregates;
- Some dendrocenoses have reached their maturity and have started their degradation.

Despite the good findings about the general state of health of forests in the Rila National Park, (by degree of damage - healthy forests are 97.9%) it is necessary to have a more detailed overview on the size of forest areas affected by different damages and the expected losses. The main types of damage and their dimensions are specified in Table 3-11. Their analysis reveals in absolute terms lost

profits and real threats to the future development of forest ecosystems. Expected losses of all categories of damage amount to a total of 302 744 cubic meters of wood mass, which is impressive in size. This quantity, compared with the total forest area in the Park, shows a loss of 10.5 cubic meters per each hectare and compared with the total area of affected forests, 120 cubic meters per hectare. Quite often, these quantities of dead wood mass are not commented not only for this protected area, but also in general for all areas. Part of the specialists accept these processes as natural and necessary to ecosystems in order to maintain the high tempo of circularity of substances in ecosystems. The calculated quantity of 10.5 cubic meters, in relation to the total area of the park, would support this position, but considering it correctly in relation to the area of the affected forests it puts the question whether new researches about human involvement are needed. And that - not only post factum - with the allowed activities for maintenance of the sanitary condition of the park forests, but also through preventive maintenance of forest ecosystems in a better health status.

Table 3-11: Damages in forests on the territory of Rila National Park, 2015

Types of damage	Affected forests in ha	Expected losses in cubic meters
tree felling caused by snow	47.3	20 842
wood rotting	216.8	7 261
fire	245.2	1 296
tree fractures caused by snow	34.9	11 438
drying of tree peaks	1442.4	202 801
damage by machines and people	11.9	713
woodworms	520.3	58 393
Total	2518.8	302 744

Confirmation of the above-mentioned conclusions are the actually performed activities for maintaining the sanitary condition of the forests on the territory of Rila National Park. In practice, this is the conducting of sanitary fellings in areas with forests affected by damage, indicated at Table 3-12. The total amount of harvested wood for the twelve-year period from 2005 to 2015 is 46,568 cubic meters. This accounts for 15.4% of the estimated total loss amounts calculated at the inventory in 2015 indicated at Table 5. The reasons for this negligible amount are many and variable, but the negative effect of abandoning these activities is not just economic (potential material, financial and social losses). The accumulative effect of the constant increase of affected areas caused by different types of damages will in the future increase the risk of deterioration of the health status of forest ecosystems on the territory of Rila National Park. An example for that is the Parangalitsa Reserve, where some ancient elite forests are dying (Rila National Park, 2016).

Table 3-12: Wood extracted from the sanitary maintenance activities in the forest areas of Rila National Park for the period 2005-2015 in cubic meters, 2016.

Year	Wood extracted by categories					**Total**
	Construction timber				Firewood	
	Large	Medium	Small	Total		

2005	540	80	15	635	2790	3425
2006	630	190	75	895	3240	4135
2007	470	145	15	630	2995	3625
2008	750	110	40	900	3170	4070
2009	3372	507	35	3914	3291	7205
2010	2540	133	2	2675	3287	5962
2011	519	30	2	551	3080	3631
2012	753	95	3	851	3674	4525
2013	1102	26	1	1129	3574	4703
2014	189	9	0	198	2390	2588
2015	257	27	26	310	2389	2699
Total	**11122**	**1352**	**214**	**12688**	**33880**	**46568**

Reviewing the share of different types of construction timber in Table 5 gives some explanation for the limited amount of activities in maintaining the sanitary condition of forests. The harvested large and medium-sized construction timber is 98.3% of the total building materials. This shows that these activities are oriented entirely in old forests with forestry indicators of the tree aggregates, providing maximum profit. Timber extraction from the forests of the park during the period 2005-2015 reveals a sustainable amount of about 3000 cubic meters per year and is connected with satisfying the needs of the local population.

The use of natural resources within the boundaries of Rila National Park is very limited. The control activity of the Park Directorate is extremely intensive, which is expressed in „…increasing the number of inspections, expanding the audited activities and detailing accountability“ (Rila National Park, 2015-2024). In practice, economic activities or activities of commercial nature are absent, and the use of the different types of natural products is mainly for pleasure (personal use). Obtaining additional income is mainly related to the collection of mushrooms. Hunting in reserves is prohibited and fishing is permitted in 34 designated fishing areas/fishing grounds.

3.2 Anthropogenic Activities within Study Area 2

3.2.1 Demographic characteristics

The population is among the most important resources of each territory. From its quantitative and qualitative characteristics to a large extent depends the overall development of the territory and every specific process and public sphere in particular.

The depopulation is one of the most important issues in the development of the surveyed region. Generally, it is defined as a process of migration of the population from the villages to the towns (in this case the city of Blagoevgrad). This leads to a change in the age structure of the rural population,

which is aging at a much faster pace. In the depopulated areas the population decreases because of the migration processes on the one hand, and on the other hand, the decrease in the birth rate and the distortion of the generational substitution in the territorial aspect. There is an increase in the effect (double effect) from the migration and a permanent deterioration in the age structure of the population. Therefore, the change in the number of the population is considered as the main quantitative indicator reflecting the demographic changes in the surveyed region.

"From a geographic point of view, depopulation means such a reduction in the number and changes in the structures of the population that lead to a permanent impossibility of its reproduction. As a result, areas with a destructive development of the settlement network are formed." (Mladenov and Dimitrov, 2005, p.379) “In the term depopulation we place a sense of a system of rural displacement in the various regions of the country, which is considered through the prism of its sustainability or instability with all the resulting from that processes of reproduction of the population, a degree of population density, a structure of the population and the "vitality" of the villages. "(Geshev, 1999, p.59)

The conducted survey of the process of depopulation of rural territories in the country in the early 90s of the XX century by Geshev shows that the surveyed territory is related to the fifth type: highly depopulated areas covered by "frontal creeping depopulation from the west to the east (from the western border territories)". These are "almost completely depopulated areas without any possibilities of revitalizing naturally". They include elderly people, native and migrated in the past retirees who use the previously abandoned houses or cottages for recreation and farm work in the yard. (Geshev, 1999, p. 68).

The population inhabiting a given territory, its demographic and social characteristics, determine to a large degree on the one hand, the opportunities for utilization of its resource potential and on the other hand, influence the development and the anthropogenic impact on that territory. The change in the number of the population gives an idea of the degree of demographic sustainability of the territory and its ability to influence it. We accept, "... the change in the number of inhabitants as a complex indicator of the natural and mechanical movement of the population and its age structure, which assesses the existing working and living conditions in a given region" (Mihailov et al., 1999, p.17).

Number and distribution of the population. For the entire period 2001 - 2016, the municipality of Blagoevgrad has a permanently shaped tendency of decreasing the population, despite some fluctuations such as 2005, 2008 - 2011. In this sense, the municipality is not an exception to the overall tendency for the whole country. In absolute terms the population decreases by more than 2500 people for a period of 16 years, therefore the rate of decrease is not high and it is lower than the average for the country (Table 3-13).

Interesting is the change in the number of the population of the city of Blagoevgrad. For the reviewed period, the same trend of population decline is observed, by about 1869 people, of the last

year compared to the year before. In individual years there is an increase over the same period (2005 compared to 2004), as well as from 2008 to 2011. These findings are based on the absolute number of the population of the city. They correspond also to the periods of growth of the total population of the municipality. The comparison of these peculiarities in the change of the number of the population with its relative share to the total population of the municipality shows some differences. The relative share of the urban population in the municipality has been increasing from the beginning of the period to 2009 and then started to decrease but retained a higher value at the end of the period compared to its beginning (Table 3-13). This gives a reason to be assumed that the reduction of the total population of the municipality is mainly due to the decrease of the rural population. This is evidenced by the dynamics of the number of the population in the villages in the municipality, both in the absolute number and in its relative share (Table 3-13).

The density of the population in Blagoevgrad municipality follows the tendencies typical for the population as a whole, which is logical. It is more important to note that the density of the municipality (124 - 125 p/km^2) is much higher than the average for the country (below 70 p/km^2). The density of the population in the catchment area of the river Blagoevgradska Bistritsa, if we exclude the city of Blagoevgrad, is very low, only 1.95 p/km^2. The reasons for such exclusion are related precisely to the fact that the city is located almost at the mouth of the river and cannot affect the rest of the territory of the catchment area. It is also sufficiently remote from the protected area - the reserve "Parangalitsa" and the National park "Rila". By including the city, the population density of the catchment area is changed to 304.4 p/km^2.

In the protected area National Park "Rila" and respectively the Reserve "Parangalitsa" there are no settlements and permanent residents. Therefore, the demographic resources and processes will not be mentioned and commented on this territory.

Table 3-13: The dynamics of the total population of the municipality of Blagoevgrad and of the ratio between urban and rural population (2001-2016).

Years	Total (number)	Urban (number)	Rural (number)	Urban %	Rural %
2001	78472,0	71457,0	7015,0	91.06	8.94
2002	77848,0	:	:	:	:
2003	77530,0	70986,0	6544,0	91.6	8.4
2004	77384,0	70923,0	6461,0	91.6	8.4
2005	77442,0	71061,0	6381,0	91.76	8.24
2006	76859,0	70549,0	6310,0	91.79	8.21
2007	76174,0	69902,0	6272,0	91.77	8.23
2008	76242,0	70004,0	6238,0	91.81	8.19
2009	76498,0	70291,0	6207,0	91.88	8.12
2010	76708,0	70331,0	6377,0	91.69	8.31
2011	77306,0	70779,0	6527,0	91.56	8.44
2012	77080,0	70609,0	6471,0	91.60	8.40

2013	76951,0	70573,0	6378,0	91.71	8.29
2014	76740,0	70438,0	6302,0	91.79	8.21
2015	76283,5	69951,5	6332,0	91.70	8.30
2016	75929,0	69588,5	6340,5	91.65	8.35

Source: NSI and own calculations

In the studied territory Blagoevgrad municipality, the population is distributed in 26 settlements, from which one city and 25 villages. The city with its population dominates remarkably over the remaining settlements (Table 3-14).

The distribution of the villages according to the number of their inhabitants in Bulgaria is as follows: small (up to 500 p), medium (501-1000 p), large (1001-2000 p) and very large (over 2000 p). In Blagoevgrad municipality dominate the small villages with population up to 500 p. - 76% and the other 24% are in the next category - medium villages. From the higher categories, there are no villages in the studied municipality. That is why we introduce the category of very small villages (up to 100 p). These are 12 villages out of 25 in the municipality or 48% (Table 3-14). This distribution of the villages according to the number of their inhabitants outlines a tendency of depopulation of the villages, which is manifested in two directions: from the state border to the interior of the territory and the second direction from the high mountainous territories to the Struma river valley. From all of the 6 villages with a population of less than 50 p., five are located in the western part of the municipality, in the mountain area and only Marulevo village is located to the east of the Struma River in the catchment area of the river Blagoevgradska Bistritsa, on one of its left tributaries.

Table 3-14: Population by settlements according to the census (2001 and 2011) and to 31.12.2016

Settlement	Population 2001	Population 2011	Alteration (2001-2011)	Population 2016	Alteration (2011-2016)
Blagoevgrad municipality	78 133. 0	77 306. 0	-827	75 929. 0	-1377
City of Blagoevgrad	71 144. 0	70 779. 0	-356	69 588. 5	-1190.5
Belo pole	603	613	+ 10	597	-16
v. Bistritsa	151	90	-61	85	-5
v. Buchino	134	88	-46	71	-17
v. Bulgarchevo	340	320	-20	280	-40
v. Gabrovo	73	36	-37	23	-13
v. Gorno Harsovo	115	78	-37	60	-18
v. Debochitsa	29	15	-14	18	+3
v. Delvino	50	56	+6	86	+30
v. Drenkovo	123	91	-32	72	-19
v. Dabrava	117	103	-14	136	+33
v. Elenovo	161	189	+28	181	-8

v. Zelen dol	223	220	-3	194	-26
v. Izgrev	509	576	+67	567	-9
v. Klisura	26	28	+2	15	-13
v. Leshko	303	197	-106	158	-39
v. Lisia	31	11	-20	7	-4
v. Logodaj	291	274	-17	287	+13
v. Marulevo	74	43	-31	83	+40
v. Moshtanetz	56	68	+12	59	-9
v. Obel	29	26	-3	21	-5
v. Padesh	835	683	-152	594	-89
v. Pokrovnik	855	891	+36	909	+18
v. Riltsi	852	915	+63	880	-35
v.Selishte	350	292	-58	251	-41
v. Tserovo	659	657	-2	661	+4

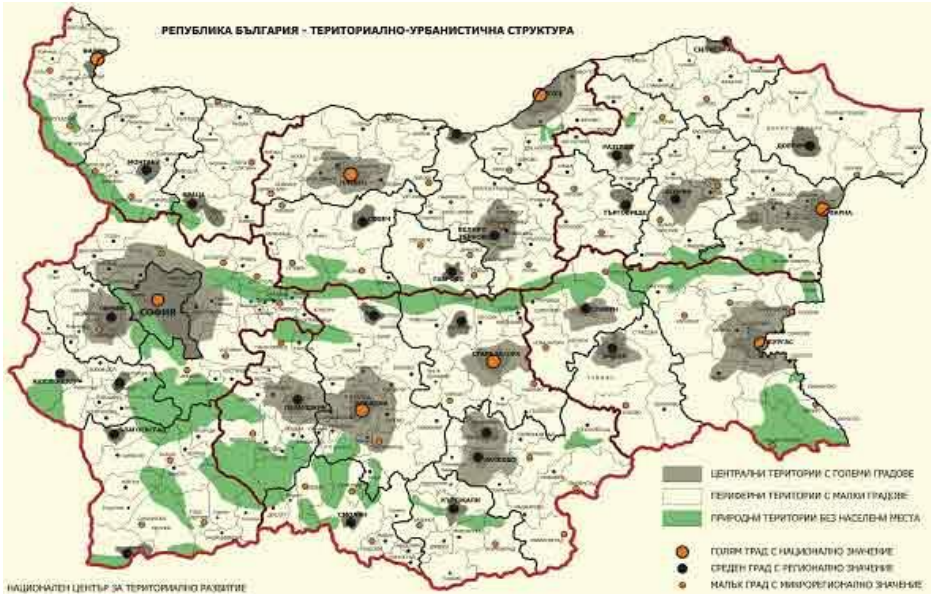
Source: NSI and own calculations

In the water catchment area of the river Blagoevgradska Bistritsa there are five villages: Bistritsa, Gorno Harsovo, Delvino, Marulevo and Elenovo. Four of them are seriously threatened by depopulation, because the village of Marulevo has a population less than 50 p., and the villages of Bistritsa, Gorno Harsovo and Delvino have a population of 51-100 p. Only the village of Elenovo has a population over 100 g, but still less than 200 p. (Table 20) Therefore, the depopulation of the Blagoevgrad Bistritsa river basin is strongly expressed. The process is irreversible. This gives a reason to believe that the anthropogenic load can not be high. The only exception is the mouth of the river because the city of Blagoevgrad is situated there. This analysis refers to the census data in 2011.

Between the last two censuses of the population (2001 and 2011) in Bulgaria, Blagoevgrad municipality shows negative trends because its population decreases by 827 p. This trend is typical both for the city that loses 356 p. and also for another 17 out of 25 villages. Therefore, only eight villages in the municipality show an increase in their population. In some of them the growth is barely noticeable (almost symbolic) - by 2 to 6 p. (village of Klisura, village of Delvino). In other villages the increase in the population is significant for the size of Bulgaria and the region, with more than 60 p. - the villages of Izgrev and Riltsi (Table 20).

The settlements situated in the catchment area of the river Blagoevgradska Bistritsa have a predominantly negative tendency to change the number of their population for the period between the two censuses. Out of the five villages located in the catchment area of the river Blagoevgradska Bistritsa, three fall into the group of villages that are depopulated. These are the villages of Bistritsa (-61), Gorno Harsovo (-37), Marulevo (-31) and the town itself (Fig. ...). For a period of 10 years (2001 - 2011), these three villages lose between 32% and 42% of their population. That is why in them the depopulation is very strongly manifested. Blagoevgrad for the same period of time loses only 0.6% of its population, i.e. in it there is no process of depopulation. The only exception of this tendency are the villages Elenovo and Delvino, where the population grows by 28 and by 6p. Both villages are

located in close proximity to the city and owe the increase of their population to the rururbranization (desurbanization). This process is also happening also in other places in Bulgaria. It is typical for the villages located around big cities. This is a process where the urban lifestyles is transferred to settlements without urban status; i.e. the inhabitants of the respective settlements lead a way of life typical for the citizens and do not engage in activities specific to the rural way of life. An example in this respect in Bulgaria are the villages along Sofia, Plovdiv, Varna, Burgas, Ruse, Stara Zagora and several other big cities that have become villages of wealthy citizens from the big city, but practically they are still villages (fig. 3-9). Between 2011 and 2016, the development of the depopulation process is deepening. The settlements that have registered a population decrease are increasing to 18. In territorial aspect, the dynamics is greater, because six villages, which in the previous period reported population growth, now show a loss of between 8 and 35 inhabitants. These are the villages of Elenovo, Belo pole, Izgrev, Klisura, Moshtanetz and Riltsi (Table 20). From them, only the village of Elenovo is situated in the catchment area of the river Blagoevgradska Bistritsa. Only two villages among those with a population increase in the period between the censuses, keep the trend up to the moment. These are the villages of Delvino and Pokrovnik, whose population increases respectively by 30 and by 18 p. in the period 2011-2016. The Delvino village is situated in the catchment area of the river Blagoevgradska Bistritsa, which proves the development of the process of rururbanization. It is also confirmed by the fact that five villages, which among the censuses showed a decrease in their population, show growth in the period 2011 - 2016. These are the villages of Debochitsa, Dabrava, Logodash, Marulevo and Tserovo. All these villages are located around Blagoevgrad at a distance of 25 km. From this group, only the village of Marulevo is located in the catchment area of the river Blagoevgradska Bistritsa.



central territories with large cities peripheral areas with small towns natural areas without settlements

Figure 3-9: Territorial-urban structure of the Republic of Bulgaria (Source: NATIONAL STRATEGY FOR REGIONAL DEVELOPMENT OF THE REPUBLIC OF BULGARIA FOR THE PERIOD 2005-2015)

Depopulation is closely related to the level of the birth rate. From a regional point of view, it is much more pronounced. As many authors note in their studies (Geshev, 1990; Ganev and others, 1997; Slaveikov and ..., 1997; Ganev, 1998; Hadzhieva, 2003; Mladenov and ...; 2005; Patarchanova, 2007) in the second half of the XX century, as a result of the socio-economic changes, the reproduction regime of the Bulgarian population is also changed. This is even more categorically pronounced in the villages. The migratory flow from the villages to the cities not only leads to their depopulation but changes the fertile contingent of these settlements and territories, which reflects negatively the reproductive behavior of their population. As a result, since the mid-1960s the birth rate has declined throughout the whole country, and since the 1990s it has remained at an alarmingly low level. The trend continues throughout the 21st century. The studied territory is no exception to it, but here it appears a little weaker. The birth rate varies from 676 to 827 (Figure 3-10). The main reason for the relatively higher birth rate is due to the presence of a big city in the municipality because Blagoevgrad is not only the administrative center of the municipality but also of the whole area. And although its population is below 100,000 p. and therefore does not fall into the category of the largest cities in Bulgaria, it has its own demographic potential. This is also shown by the coefficient of the birth rate in the city that ranges from 10 ‰ to 11 ‰. Higher values for this indicator have only four cities in Bulgaria - Sofia, Plovdiv, Varna and Sliven (Cities and ... .2016). The analysis shows that a change in the reproductive behavior of the population can not be expected. From the demographic point of view, the low birth rate (in terms of natural reproduction) in the municipality is due to the decreased fertility of women in fertile age and the decrease in their number. The total fertility rate (average number of children that a woman gives birth throughout her fertile period) is about 1.7 children, which is a low value for this indicator, i.e. we have a narrow reproduction of the population. The optimal theoretical minimum to provide a simple reproduction of the population is 2.1 live births per woman. The currently negative effect of the decreasing number of women in fertile age will affect the reproduction of the population over the next decades. This is due to both the negative changes in the age structure of women aged 15-49 and the decreasing absolute size and relative share of girls aged 0 to 14 who will participate in the reproduction of the population in the municipality in the following decades. The alteration is due to the changes in the socio-economic conditions, and from there in the value system of women - in the foreground come out values such as graduating higher education and ensuring better work, successful professional careers, etc. However, it is expected that this trend of a slightly higher birth rate than the average for the country will maintain.

The level of mortality also influences strongly the depopulation processes. When it exceeds the birth rate, the depopulation occurs naturally. By the mid-1960s the mortality rate in the country has been decreasing (Ilieva and Mladenov, 2003, p.104). After that it begins to grow gradually due to the demographic aging of the population. Since the mid-1990s, mortality rates have passed the threshold (12 ‰), ensuring the simple reproduction of the population (Mladenov et al., 2005, p. 384).

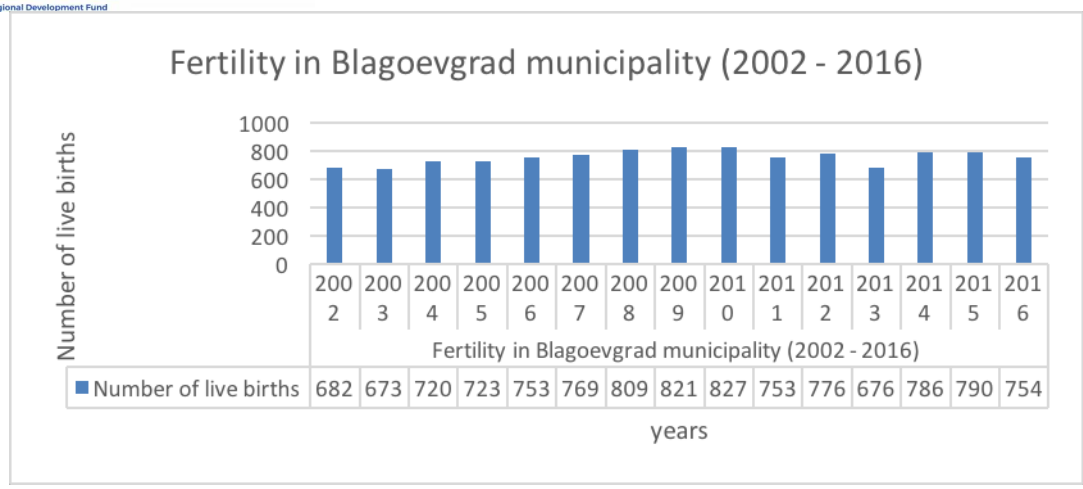


Figure 3-10: Fertility in Blagoevgrad Municipality.

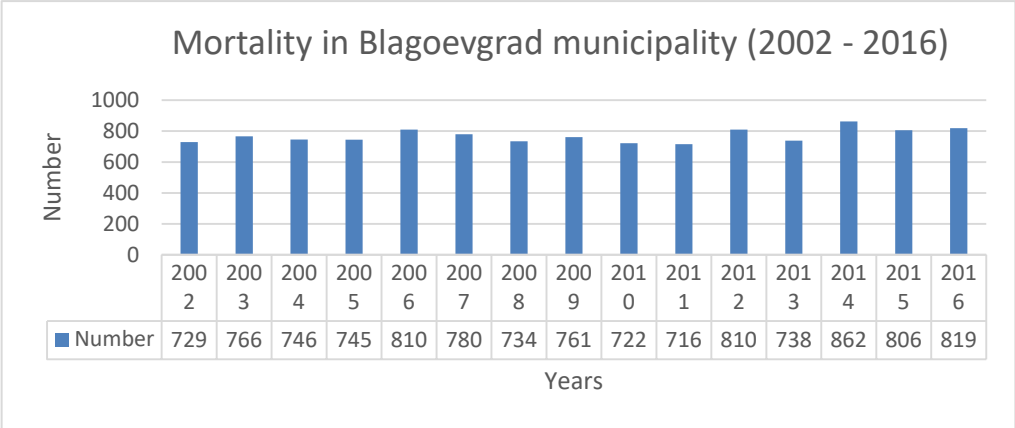


Figure 3-11: Mortality in Blagoevgrad municipality.

The high level of total mortality (including premature and childish) is among the most alarming demographic issues. A major factor driving the dynamics of overall mortality is the demographic aging process. This process is a result of changes in the age structure of the population, and it reduces the relative share of young people in the general population and increases the share of older people. The mortality rate for men is relatively higher than for women. This is due to the lifestyle, increased risk in working conditions, high levels of stress, etc. The unusual rise in overall mortality is also due to the significant economic and social changes in the conditions of market economy and to the manifestations of economic crisis over the last few decades.

Reducing the impact of the risk factors that determine the high mortality rate among men between the ages of 40 and 59 and also for all ages will contribute to lowering the overall mortality rate in the municipality (Municipal Plan ...). Due to the aging of the population and the deterioration of the quality of health care in the villages adjacent to the municipality, in recent years there has been a steady tendency to maintain relatively high mortality rate, although they are lower than those for the country as a whole (Figure 3-11). The overall mortality rate in the surveyed territory fluctuates in a relatively small range from 716 to 862 cases per year. Against the background of the overall

mortality in the municipality stands out the city itself, with relatively more favorable values of the coefficient of mortality about 9 ‰. This is one of the lowest values in the country and the lowest among major cities (Cities and ... .2016). The big differences between the city and the surrounding villages in the municipality are due to the fact that in the villages live mainly older people, which also increases the level of total mortality.

The reproduction of the population in a given territory is manifested by its constant revival or by the change of generations. The quantitative aspect of the process is expressed by the natural movement of the population.

The natural growth shows the state of reproduction of the population and its demographic potential. Based on the fact that it is a function of the birth and the mortality rate, it is natural to expect higher values in the surveyed territory than in the country. This holds true for the city that traditionally maintains positive values for this indicator. For the studied period, they fluctuate between 1.5 ‰ and 1.8 ‰. Blagoevgrad is one of the few cities in the country that still have positive values of natural growth. The rest of the surveyed territory shows greater dynamics with regard to the natural movement of the population. The natural growth has both positive values (between 37 and 105) and negative in a large range (from -93 to -8), (Table 21). The periods with positive (2008 - 2011) and negative (2002 - 2007, 2012 - 2016) values of the natural growth in the municipality are clearly outlined (fig.3-12).

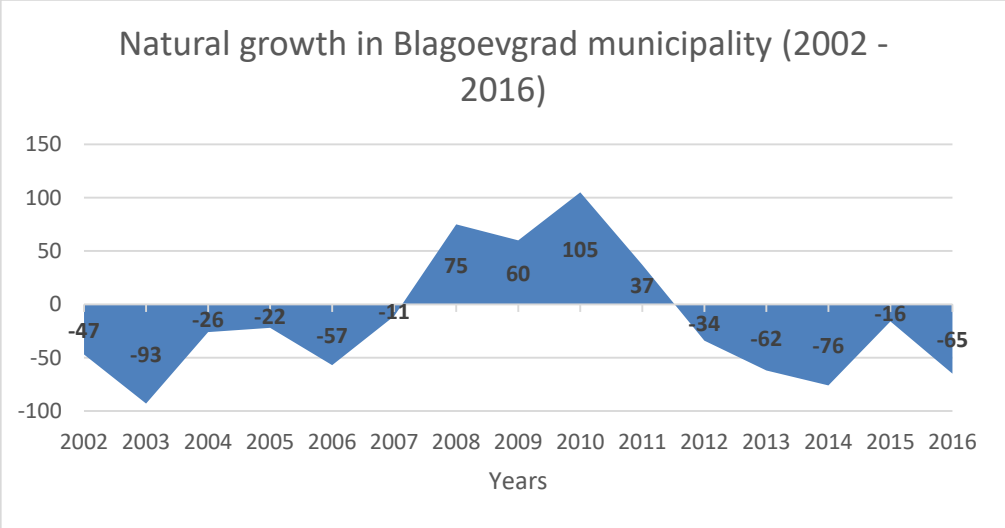


Figure 3-12: Natural growth in Blagoevgrad municipality.

In the recent years, the negative values of natural growth have increased, therefore, reducing the demographic potential of the municipality, and this is a limiting factor for its future socio-economic development, but from an ecological point of view has its advantages. The combination of demographic resources and environmentally friendly natural conditions is a good basis for successful investments in infrastructure, production of foods and organic products, rural and environmental tourism, etc.

The migrations, both external and internal, are an essential component of the demographic development and are important for the territorial distribution of the population and the process of depopulation. Throughout the twentieth century, in their basis were the socio-economic factors, according to which the main direction of migration is "village-town". As a result, the urban population is growing and vast rural areas have been depopulating (Geshev, 1994; Mladenov and ... 1998; Kojuharova-Zhivkova, 1998). "The share of migrants from the villages to the towns gradually decreased between 1976-1985. ... and the dominant role of the "city-city" migration is taken into account. This is due to the large demographic "erosion" and depopulation of the rural areas, which have already been deprived of their basic migration potential - enough young people "(Tsekov, 1999, p. 43). In the 1990s, the migratory flow from the towns to the villages has dominated over the traditional. The main factors include the land reform, land restitution, the transformation of the economy into market, hidden and apparent unemployment, limited financial capacity of the population, etc. (Hadjieva, 2003).

The surveyed territory is no exception to these trends typical for the country as a whole. On the contrary, here the manifestation of some of the factors is even stronger. The peripheral geographical position of the administrative area to the territory of the country is a reason for the migratory flow from the villages and smaller towns to be directed, throughout the second half of the 20th century, towards the city of Blagoevgrad. This also leads to the shaping and development of the urbanized area. The significant demographic resource accumulated over the years, in the 1990s starts to return to their native places, "feeding" the city-village migration. The graphics in Fig. 3-13 show the change in the mechanical growth of the population in the municipality of Blagoevgrad, as well as the differentiation by type of settlements. The negative values of the indicator prevail, with the exception of two periods 2004-2005 and 2008-2009. The finding is very unfavorable that the majority of the population, which leaves the territory of the municipality of Blagoevgrad is from the city itself and not from the villages. This has a negative impact on its economic development. The main reasons for migration of the population from the city are the attractiveness of other cities in Bulgaria (mainly Sofia) and abroad, related to the opportunities for finding better jobs, better condition of the urban infrastructure, obtaining higher education, etc. The potential emigrants are people aged 20-35, and 2/3 of them have secondary and higher education. Therefore, migrants are young and educated people in which the state has invested and who are more adaptable to the new environment.

The emigration of young and highly educated people has economic and social implications for the future development of the municipality. It has a negative effect on the reproduction of the population because women of fertile age are leaving the territory, which reduces the potential future birth rate not only for the next 10-15 years but also for a longer period of time. The motives for emigration in the past 25 years are mainly related to ensuring employment, higher incomes and living standards, a strive to live in a better urban environment. This motivation is complemented by the pursuit of educational and professional realization.

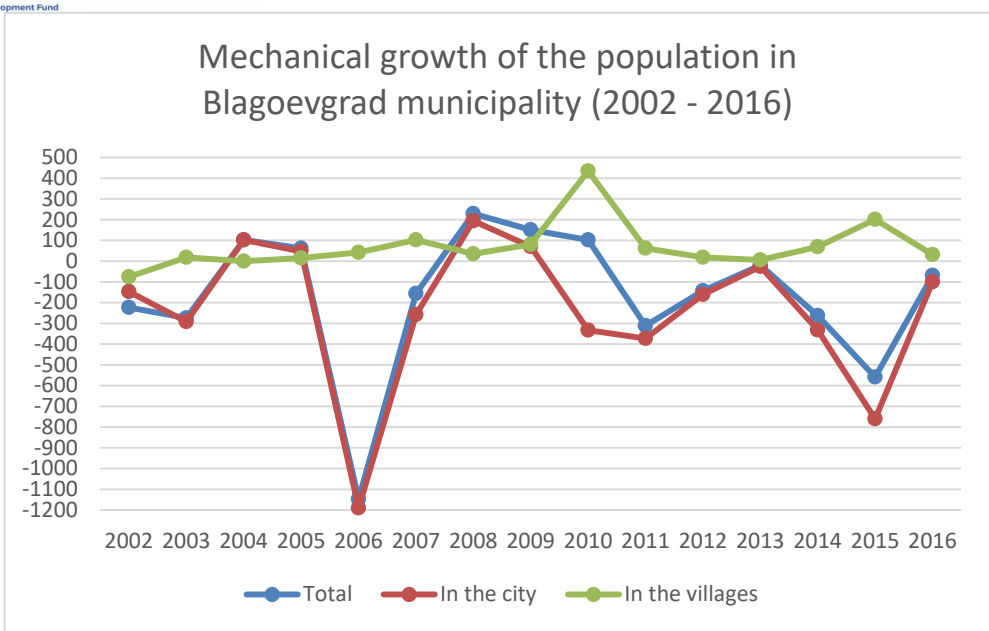


Figure 3-13: Mechanical growth of the population in Blagoevgrad municipality.

The situation in the villages is different. The already formed tendency of positive mechanical growth for almost the whole period is well visible. Villages attract population, mainly from the city, i.e. this is another confirmation of the described rururbanization typical for the villages located near Blagoevgrad. The remote from the city villages, especially those located in the mountainous part of the territory, lose their demographic resources that are settled in the city or in the larger villages of the municipality. A leading factor in choosing a place to settle is the financial one.

The gender structure is one of the factors influencing the natural reproduction. The male/female ratio is mainly determined by the gender differentiation of mortality and birth rate. In the studied territory - Blagoevgrad municipality, the ratio between boys and girls in newborns is 105:100, or from 1000 live births 510 are boys. With aging, the gender ratio is increasingly dependent on the mortality rate in the municipality, as we have already noted for men over the age of 40 it is higher as compared to women's mortality rate. From the demographic point of view, the most favorable is the gender structure, which has a slight predominance of men to retirement age, and the prevalence of women after this age is negligible. Such gender structure implies maintaining optimal marriage, and through it, optimal fertility. On the other hand, the higher share of men of working age is favorable from the point of view of the formation of labor resources. With a significant predominance of women over men, the normal reproduction of the population and marriage is being violated. It is therefore of particular importance that there is a gender balance in childbearing age.

Marriages are an important indicator that is influenced by several important factors, including gender structure, age structure of the population, psychological attitude towards reproductive behavior, the traditional reproductive model adopted by the parents or the environment, education level, etc. In the recent past, marriages have had a direct impact on birth rates, but over the past two to three decades, it is important but not a determining factor. In Bulgarian society, as well as in many

countries in the world, other cohabitation models with different degrees of success and sustainability have already been imposed. It is for this reason that in Bulgaria the number of marriages is constantly decreasing. The marriage rate changed from 7.13 ‰ in 1989 to 3.9 ‰ in 2007 and is currently 3.4 ‰. The surveyed territory is no exception to this trend. It can be assumed that after 2008 there is a more significant decrease in the number of marriages concluded by about 90 and the trend continues. The differentiation of marriage by settlements shows that between 90% - 95% of the marriages are concluded in the city (Figure 3-14). Therefore, the age structure of the rural population is permanently worsened, dominated by population in the upper age groups.

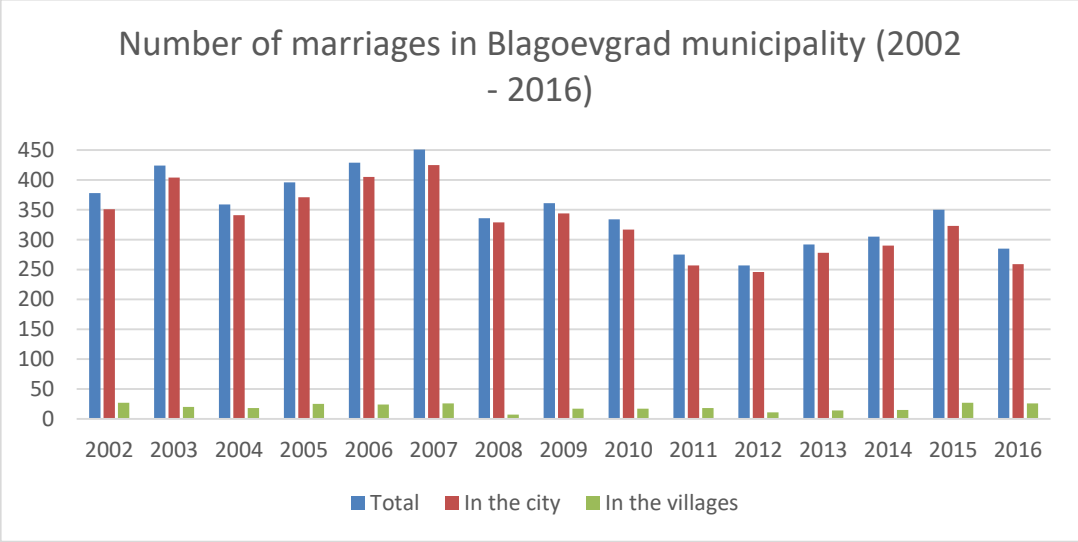


Figure 3-14: Number of marriages in Blagoevgrad municipality.

An indirect evidence of the growing "unattractiveness" of legal marriage is the distribution of the population by legal family status. While in 2001, 64.6% of young people aged 20-29 were unmarried, in 2011 their share was 82.2%. Even greater is the increase in the share of unmarried among 30-39-year-olds - from 18.2 to 42.1%, between the last two censuses. At the same time, the share of those living together, without marriage, has increased considerably over the same period. In 2001, 4.7% of the population aged 20 and over was in factual cohabiting, and in 2011 this share was already 9.4%. The greatest increase in the number of people living in marital cohabitation is observed among 30-39 year olds - 13.0%, followed by persons aged 20-29 years - 6.4%.

The number of divorces in Bulgaria has remained relatively stable over the years. In the period between 2002 and 2016, about 10,000 marriages are being destroyed annually, with the largest increase in divorces being observed between 2004 and 2008, when more than 14,000 marriages per year were ruined. Peak in divorces was registered in 2007 - over 16,000. Of all terminated marriages, 82.0% refer to the urban population. In the studied territory - Blagoevgrad municipality - there is a trend of continuous increase of the number of divorces from 73 in 2002 to 143 in 2016, i.e. they almost doubled. The most divorces were registered in 2008 - 172. The comparative analysis of marriage and divorce records shows that between 30% and 40% of marriages are being destroyed.

The distribution of divorces by type of settlements shows an even higher concentration in Blagoevgrad (93% - 98%) (Figure 3-15).

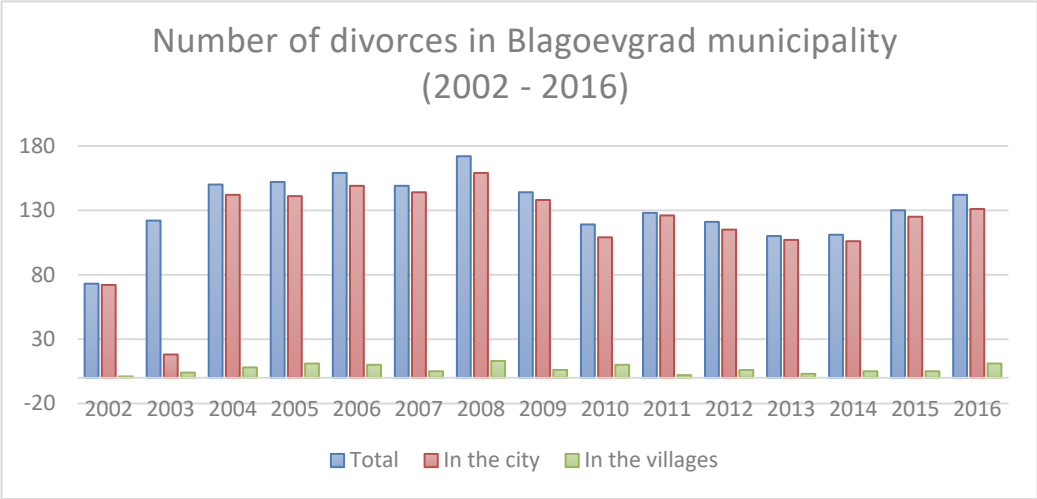


Figure 3-15: Number of divorces in Blagoevgrad municipality

The age structure of the population is of particular importance because it is influenced by the natural reproduction of the population and it is relevant for the labor resources. The narrowed reproduction of the population in Bulgaria does not allow natural replacement of generations. Therefore, the share of the under-active population is lower than that of the population over working age. The age structure of the population is also very important for the overall socio-economic development of the territory. Each age group has different living and working possibilities and participate differently in the material production and the spiritual life of the society. The change in the age structure of the population is crucial for the formation of labor resources. Because of the low birth rate in the municipality, the working-age population occupies the smallest share of the population in the surveyed territory. The town of Blagoevgrad has a higher share of the population in working age than the average for the country. This is among the most favorable demographic characteristics, because it allows to ensure in the near future the formation of sufficient labor resources (Figure 3-16a). Unfortunately, this is not the trend in the other settlements in the municipality. However, for the whole analyzed period of 15 years, the working population in the municipalityhas decreased by about 1300 people, in the city itself - by 1276 people. And this is because a large part of the villages in the municipality have no population of this age group. It is clear that it is almost entirely concentrated in the city.

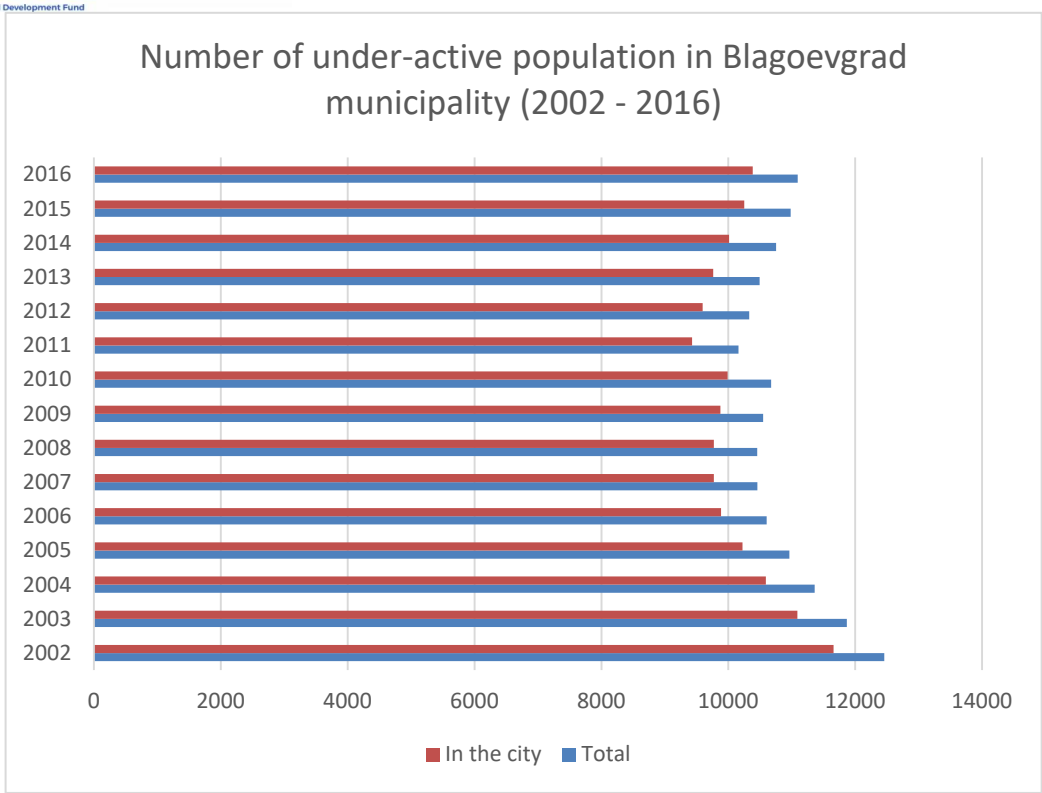


Figure 3-16a: Number of nder-active population in Blagoevgrad municipalty

The share of the working age population in the municipality is above the national average. Its territorial distribution between the city and the villages is relatively more balanced (Figure 3-16b). This creates preconditions for the development of economic initiatives and productions not only in the city but also in those villages where the population of this age group is concentrated. These are the large villages in the municipality located near the town, connected with good road infrastructure with the city. It allows residents to enjoy the services the big city offers, but to live in one-family houses with courtyard spaces, and in a relatively more peaceful environment, which the villages concerned have. Only the village of Elenovo is in the catchment area of the river Blagoevgradska Bistritsa. The comparative analysis of the data from Table 8 shows that the working population in the municipality has increased steadily from 2002 to 2005, and then has declined. The dynamic of the working population in the city is more positive. Its number at the beginning and the end of the period remained almost unchanged, with an increase in individual years. It is also due to changes in the labor law, which are an increase in the retirement age.

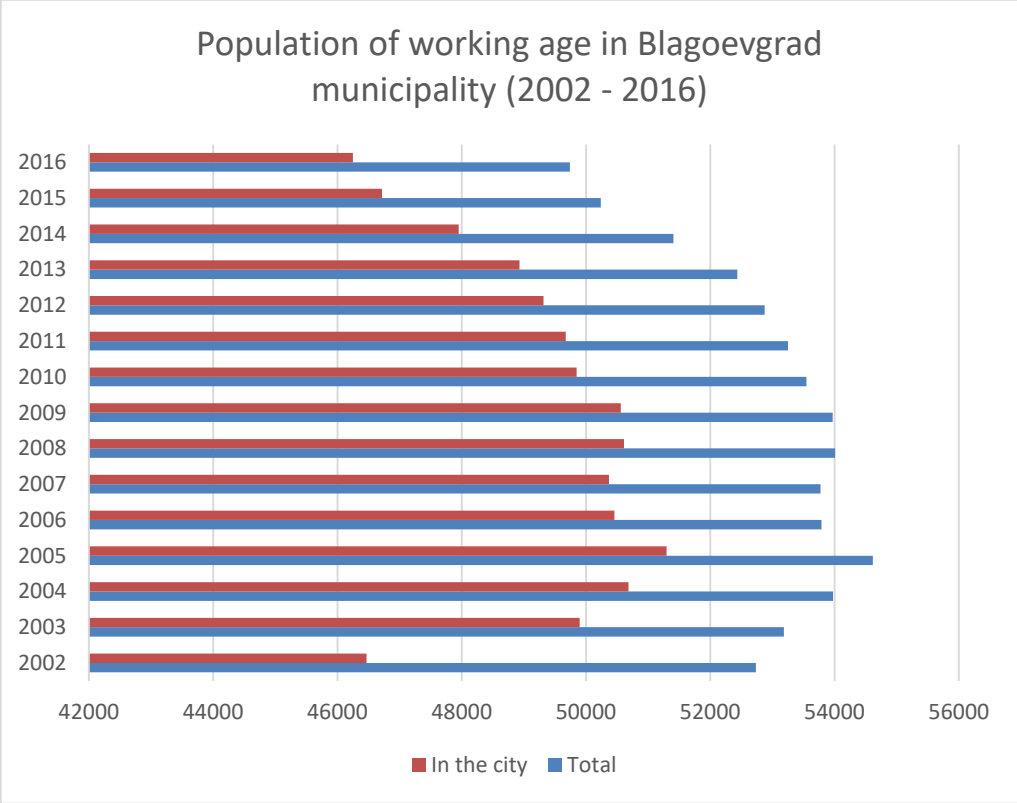


Figure 3-16b: Population of working age in Blagoevgrad municipality

The share of the population of above working age in the municipality is close to the average for the country. According to data for 2012, we have a relatively low demographic burden in the city, with young and old generations accounting for 28% of the working age population, with an average of 47% for the country. Unfortunately, there is a high demographic burden in the other settlements in the municipality. However, as a whole Blagoevgrad municipality has a lower demographic burden compared to the country, where there are worrying tendencies of growing the number of elderly people and a decrease of the young generations that are to be included in the working partners (Municipal plan ...).

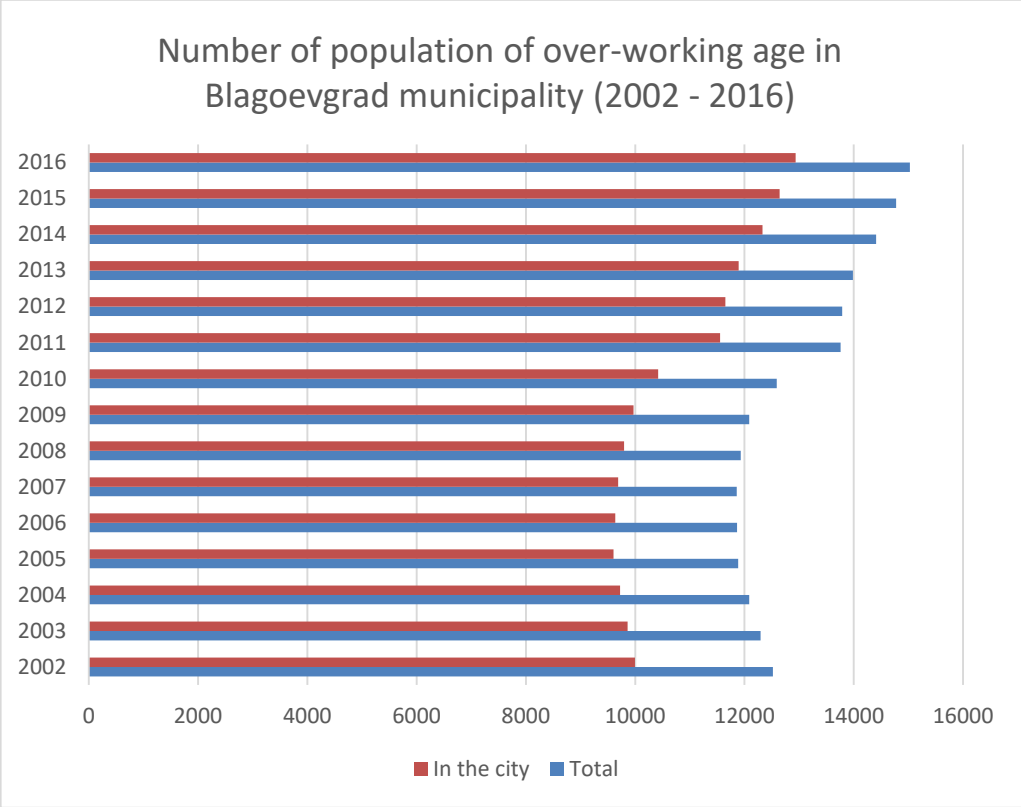


Figure 3-16c: Number of population of over-working age in Blagoebgrad municipality

Table 3-15: Demographic indicators in Blagoevgrad municipality (2003 – 2016), Source: NS

Years	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fertility (number)	682	673	720	723	753	769	809	821	827	753	776	676	786	790
Mortality (number)	729	766	746	745	810	780	734	761	722	716	810	738	862	806
Natural growth (number)	-47	-93	-26	-22	-57	-11	75	60	105	37	-34	-62	-76	-16
Infant mortality (number)	9	3	5	7	6	4	3	2	2	8	2	4	5	2

According to a number of demographic indicators, the studied territory - Blagoevgrad municipality shows a better condition than the average values for Bulgaria. Despite some negative trends, such as population decline, it still has a relatively good demographic potential, better than dozens of municipalities in the country. The demographic situation in the surveyed territory is more favorable than in the country. The fertility rate is still higher than the country average, the natural growth rates in some years are positive or close to 0 ‰ and so on.

There are large disproportions in the demographic indicators between the city and the other settlements in the municipality. There are problems of the "center-periphery" type, which will be deepening in the future and will have an unfavorable effect on the overall development of the

territory. The depopulation will cover new territories and will "descend" ever lower, i.e. will cover areas with a lower altitude.

The settlements located in the catchment area of the river Blagoevgradska Bistritsa will have a lesser impact on the natural environment, especially on the protected areas of National Park "Rila" and the "Parangalitsa" Reserve because their population is limited in numbers, the depopulation is deepening and they completely will lose their demographic resources. Only the city of Blagoevgrad has its considerable demographic potential, which will be preserved despite some negative processes, but considering that it is located very close to the mouth of the river, its impact on the protected areas will not be significant.

3.2.2 Energy analysis

The area of interest has a predominantly mountainous character of the surface. Rila National Park occupies the central, highest regions of the Rila Mountains. No settlements and industries exist within park's borders. Energy production is however present in a minimal extent (several small hydropower plants). The main energy consumption goes for the tourist facilities: huts, lifts, winter sport infrastructure.

On the other hand, the valley of Blagoevgradska Bistritsa spreads from the highest mountain area to the very foot of the mountain, and terminates in the large valley of Struma river. Compared to the much larger territory of the NP, It is characterized with more diverse conditions, especially regarding energy production and consumption. The larger part of the town of Blagoevgrad, along with five more villages, is situated within the catchment. The Rila Mountains possess a potential for energy production from various sources. The most notable is hydroenergy.

Hydroenergy

The name Rila is of a Thracian origin, meaning "watery mountain". It has been given to the mountain because of the abundance of running waters. The same is valid also today. In the conditions of the not so damp climate this abundance of waters is due to the geology and the geomorphological setting of the mountain.

Rila Mountains have a specific structure: they represent a huge dome rising to almost 3000 metres above sea level, the dome being deeply dissected by river valleys. Summarized, the height differences between the ridge top parts and the valleys and depressions on the western mountain foot are in the range of 2200-2300 m, and on the northern and southeastern slopes the same are in the range of 1800-2000 m. At many locations these high elevation differences provide for a great energy of running waters. Highest gradients have the rivers that flow on the southern slopes of Northwestern Rila: Kalin (289 ‰), Drushliavitsa (240 ‰), Deburshtitsa (225 ‰) (Ivanov, 1954). Many other rivers have gradients in the range of 150-175‰.

In the topography of Rila Mountains steep slopes in the periphery are combined with wide and flat summit surfaces. This configuration in specific for the mountain. It came as a result of the specific evolution of relief in Rila massif:

1.Relatively fast mountain neotectonic uplift (Tueckmantel et al., 2008) which has caused high slope gradients. In many places erosion cannot compensate to the uplift and dissect the area.

2.The relatively low height difference between mountain summits (2600-2800 m a. s. l.) and the snow line (2200-2250 m a. s. l.) during the maximum glaciation (about 400-500 m) (Kuhlemann et al., 2013), which determined weaker rates of glacial erosion in Rila compared to for example the High Tatras or the Alps. In result wide flat fragments of the old summit surface of the mountain are preserved to these days.

3.The presence during the maximum glaciation of several ice caps on the summit surface of Rila Mountains (Kuhlemann et al., 2013; Baltackov, 2004), which limited the erosion on the summit surface while enhancing it on slopes.

4.The crystalline bedrock: mostly granite and gneiss, which under the influence of weathering tend to fragment on coarse sand and gravel, thus producing rounded forms on the surface and thick covers of loose material on mountain top.

All these factors have determined the presence of vast flat areas in the zone of the cold mountain climate that retain huge amounts of snow and collect snow water. In result, considerable water resources are generated in the mountain each year, even though the amount of atmospheric precipitation in the high mountain area is not so high (900-1000 mm/year) (Kuhlemann et al., 2008; Nojarov, 2017). A special role for this play the extensive loose material covers on mountain summit surface, which accumulate impressive amounts of water, and the bedrock composition, which does not provide for a deep subsurface drainage of waters. In the low temperature conditions of the mountain climate evaporation losses are minimal.

The high mountain area of Rila has on average over 150 days with snow cover. For the highest areas the number of snowy days reaches 190 (Velev, 2010). So, the extensive summit surface accumulate and concentrate precipitation water, subsequently channeling water towards river valleys in the periphery. These valleys are usually steep and possess a high falling water energy potential. The long lasting of snow cover and the extensive loose material cover have a strong regulative effect on river runoff, and determine the low seasonal amplitudes of the water flow. The catchment of Blagoevgradska Bistritsa river has an area of 234 km2.

Solar energy

In high mountain the production of solar energy is favoured by the clearer atmosphere compared to the lowlands, but at the same time the high percentage of cloud cover in spring and summer afternoons appears as a serious drawback. In addition high mountain areas are usually far from the mass consumers, and this makes the production of such energy not enough beneficial. In the catchment of Blagoevgradska Bistritsa conditions for solar energy production are most favourable on the low-mountain slopes near villages that are open and face south. Conditions in the Struma valley itself are good in the most open central areas, far enough from the adjacent slopes.

Wind energy

Although winds in high mountains are generally stronger than in lowlands, the overall conditions for occurrence of strong winds with high frequency are not optimal in the Rila Mountains. One reason for this is the central position of the mountain in the eastern part of the Balkan Peninsula – in a rain and wind shadow from the adjacent ranges. This is well illustrated by the climatic data for wind velocity – the long-term average for Musala peak (2925 m a. s. l.) is 7.9 m/s while on the peaks of Stara planina it is 10-13 m/s (Velev, 2010). The presence of large flat surfaces on the mountain summit area however must be considered an asset for wind power production. Most of these areas are quite remote from the consumers and losses during energy transfer might be significant.

Geothermal energy

Several hot springs are spread around Rila Mountains. Their formation is related to deep fractures in Earth's crust which drain the mountains fissure system. As the Rila Mountains are an uplifted tectonic horst block, the deepest faults, where thermal waters are drained, surround the massif rather than cross it. In result, thermal springs, among which is the hottest in Bulgaria (that in Separeva banya), are found outside the park, far from park's borders. Considering the catchment of Blagoevgradska Bistritsa, several mineral springs exist in and around the town of Blagoevgrad, but their temperature is not high enough to provide potential for energy or heating.

Fossil fuels

As the Rila Mountains are horst structure built of solid magmatic and metamorphic rocks, no fossil fuel deposits such as coal, gas or oil, are found on their territory. In the valley of Struma there are several coal basins (Brezhani, Bobov dol, Pernik) where brown coal was extracted in the past from Paleogene sediments. Today extraction continues just in the area of Bobov dol. None of these basins however includes the area around Blagoevgrad itself. The vast grassy areas with rounded relief in the high mountain area of Rila receive considerable amounts of atmospheric water. Snow is retained there for 5-7 months a year. In the cold climate conditions of the alpine and subalpine areas this creates a potential for the formation of peat, especially in negative landforms. Cirque floors are probably best among these. Localities such as Pazardere (NW Rila), Upper Beli Istkar valley, Kazanchal cirque (E Rila), The cirque of the Seven Lakes and many others contain large amounts of peat. In the National Park however it is not used for extraction.

Energy production

In the researched areas energy production is most of all hydropower energy from small and medium size plants. The major object that operates partly on the territory of Rila National Park, is the Belmeken-Sestrimo-Chaira hydropower cascade. The main infrastructural features of the cascade are situated in the northeastern part of the Rila Mountains. The cascade has two water collection derivation systems: a higher one (at 1900 m a. s. l.) and a lower one (at 1200 m a. s. l.). The first of them collects waters from the valleys of the rivers Blagoevgradska Bistritsa, Iliina, Manastirska, Grantcharitsa, and Maritsa. The water from the rivers Blagoevgradska Bistritsa, Rilska and Iliina is collected by the water collection channel "Granchar" (Figure 3-17).

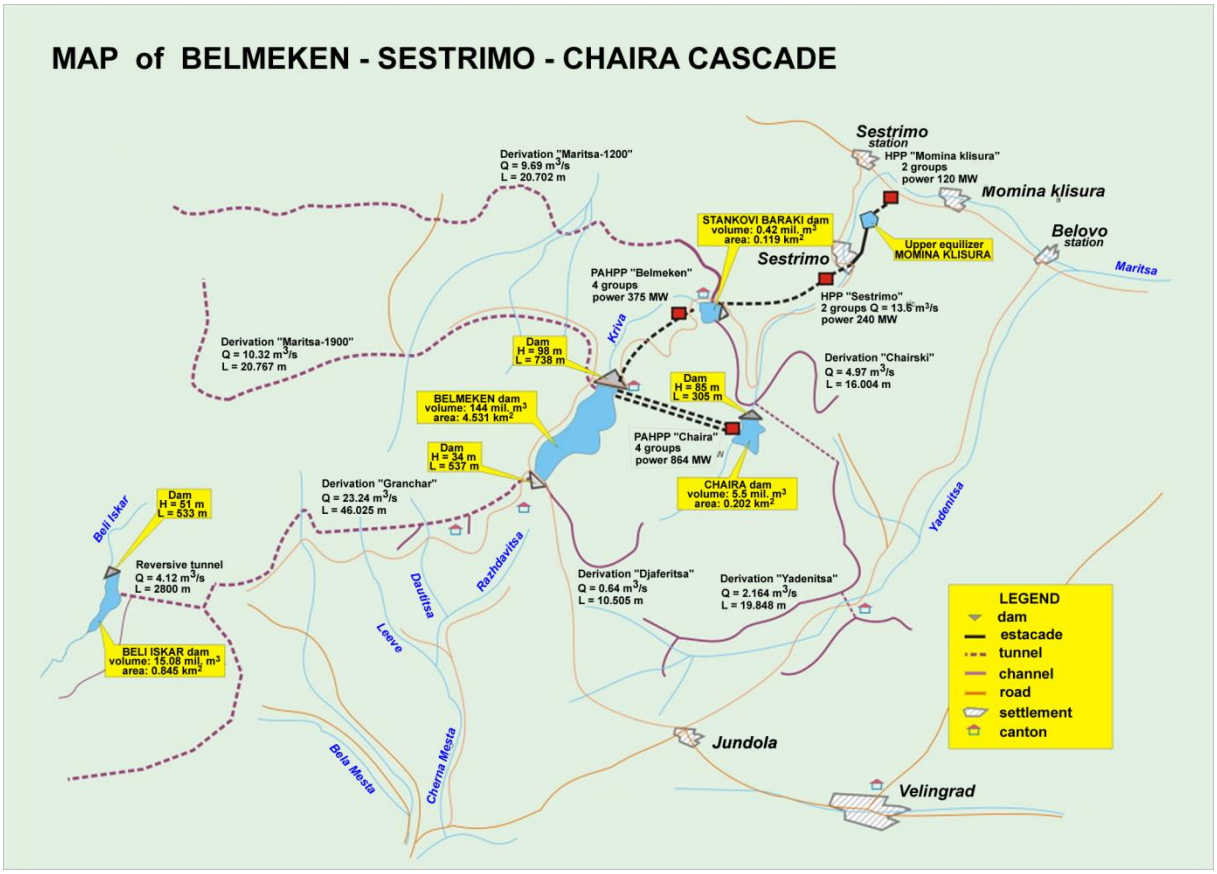


Figure 3-17: A map of Belmeken-Sestrimo-Chaira cascade (translation from NEC "Dams and Cascades")

The major element of the cascade is Belmeken dam. It is located at 1900 m a. s. l., outside park's borders but adjacent to them. It has a water volume of 144 million m3, a main dam with a height of 88 m and a smaller dam on the opposite (southern) side with a height of 23 m. The fall of water from the locality of Belmeken (1900 m a. s. l.) to the locality Stankovi baraki (737 m a. s. l.) is used for the operation of pump-accumulator power plant "Belmeken".

The second collection system encompasses the derivation channels at the altitude of 1200 m a. s. l.: Maritsa 1200, Chaira and Yadenitsa (all in NE Rila, outside park territory). The fall of water from the locality of Stankovi baraki (737 m a. s. l.) to the village of Sestrimo (554 m a. s. l.) is used for the operation of Sestrimo hydropower plant (NEC "Dams and Cascades") (Figure 3-18).

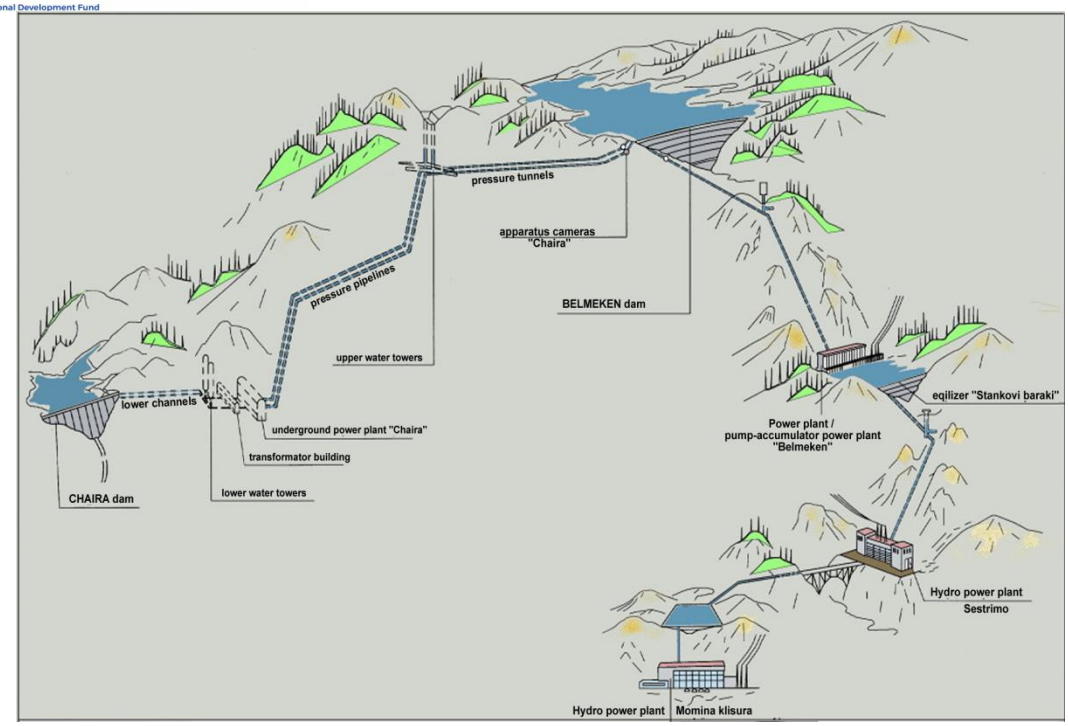


Figure 3-18: Operation scheme of Belmeken hydro cascade (a translation from NEC "Dams and Cascades")

The other large artificial water collection body in the Rila Mountains is Beli Iskar dam. It is situated in the centre of the mountain massif, at 1890 m a. s. l. centrally inside the territory of Rila National Park, and the Central Rila Reserve. It collects waters from the central area of Rila Mountains. Waters are not used for power production, but only for the water supply.

The Kalin-Karagyol hydrosystem supplies water to Kalin power plant. The latter is situated out of the borders of Rila NP, in the adjacent Rilski manastir Nature Park. Situated at 2394 m a. s. l., Kalin dam is the highest in Bulgaria. It was built in 1943-1946. It is a source zone for a cascade in the catchment of Rilska reka that includes several hydropower plants: "Kalin" (4000 kW, 740 m fall of water), "Kamenets", "Pastra" and "Rila". The average long-term annual energy production of Kalin hydropower cascade is 6.40 million kWh (Generalni shemi…). Only the highest lake Karagyol (2364 m a. s. l.), which is part of the system, is situated within the park's territory. It lies on the northern slope of Rila's Kalin ridge, and is connected by a 1800 m long water supply tunnel to pump water up in the neighbouring Kalin dammed lake, situated on the southern side of the same ridge (the Rila National Park border runs along the ridge). Five hydro power plants operate in the territory of the National Park (Table 3-16):

Table 3-16: Hydropower plants on the territory of Rila National Park.

PP	Location	River	Power (kW)	Operator
Blagoevgradska Bistritsa 1	SW Rila	Blagoevgradska Bistritsa	1,090	Blagoevgradska Bistritsa Ltd.
Belmeken (pump-acc.)	E Rila	Kriva	375,000	NEK EAD
Mala Tsarkva	NW Rila	Levi Iskar		NEK EAD
Samoranovo	NW Rila	Otovitsa	2,920	Energo Pro Bulgaria EAD
Garvanitsa	SW Rila	Strane	720	Akva vak Ltd.
Belitsa (in construction)	SW Rila	Belishka	4,000	Tema consult Ltd.

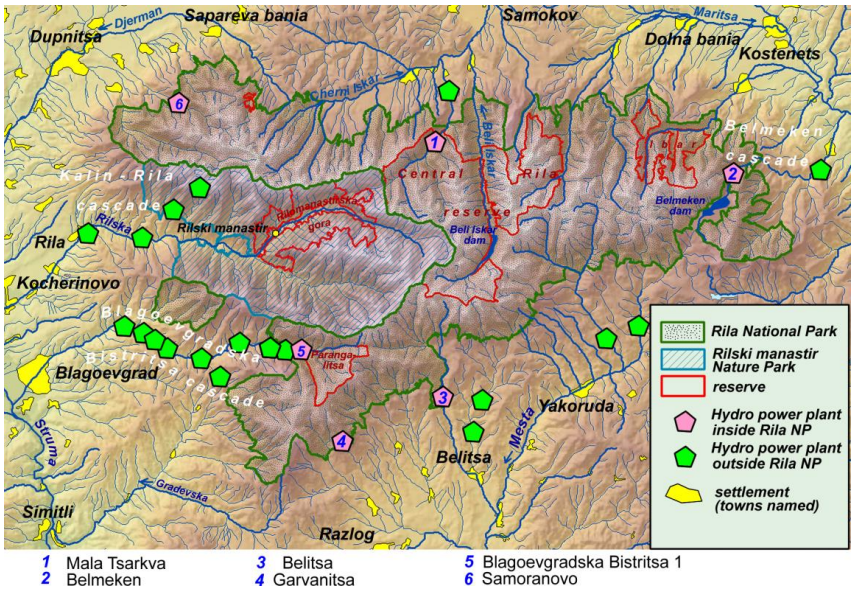


Figure 3-19: Map of hydropower plants on the territory of Rila NP.

Within the catchment of Blagoevgradska Bistritsa operates the hydrocascade "Blagoevgradska Bistritsa", which carries the name of the main river. It comprises ten small to medium-size hydro power plants: nine on the main river and one on its tributary Slavova reka (Table 3-17). The total power installed accounts to 6375 kW.

Table 3-17: The cascade "Blagoevgradska Bistritsa".

PP	Altitude	River	Power (kW)	Operator
Slavova		Slavova reka	1,680	Litex Hydro Ltd.
Blagoevgradska Bistritsa 1	1,470	Blagoevgradska Bistritsa	1,090	Blagoevgradska Bistritsa Ltd.
Blagoevgradska	1,477	Blagoevgradska	1,385	Blagoevgradska

Bistritsa 2		Bistritsa		Bistritsa Ltd.
Blagoevgradska Bistritsa 3		Blagoevgradska Bistritsa	1,000	Blagoevgradska Bistritsa Ltd.
Blagoevgradska Bistritsa 4	1,089	Blagoevgradska Bistritsa	600	Blagoevgradska Bistritsa Ltd.
Blagoevgradska Bistritsa 5	976	Blagoevgradska Bistritsa	580	Blagoevgradska Bistritsa Ltd.
Blagoevgradska Bistritsa 6	864	Blagoevgradska Bistritsa	645	Blagoevgradska Bistritsa Ltd.
Blagoevgradska Bistritsa 7	771	Blagoevgradska Bistritsa	540	Blagoevgradska Bistritsa Ltd.
Blagoevgradska Bistritsa 8	691	Blagoevgradska Bistritsa	535	Blagoevgradska Bistritsa Ltd.
Bistritsa A (small)	655	Blagoevgradska Bistritsa	665	A & A Ltd.
Kovachitsa (no longer in operation)		Bistritsa (Lazercheve)	100	Vodosnabdiavane i Kanalizatsia EOOD. Blagoevgrad

In its complete configuration the cascade has been in operation since 2012. The total annual production of the cascade (in condition of average water amounts) is approximately 27,900,000 kWh (Uniongroup). Until 2014 the small hydro station Kovachitsa was operating on Blagoevgradska Bistritsa near Lazarcheve (a quart of Bistritsa village) – a pump with an asynchronous 100kW turbine. It is no longer in use.

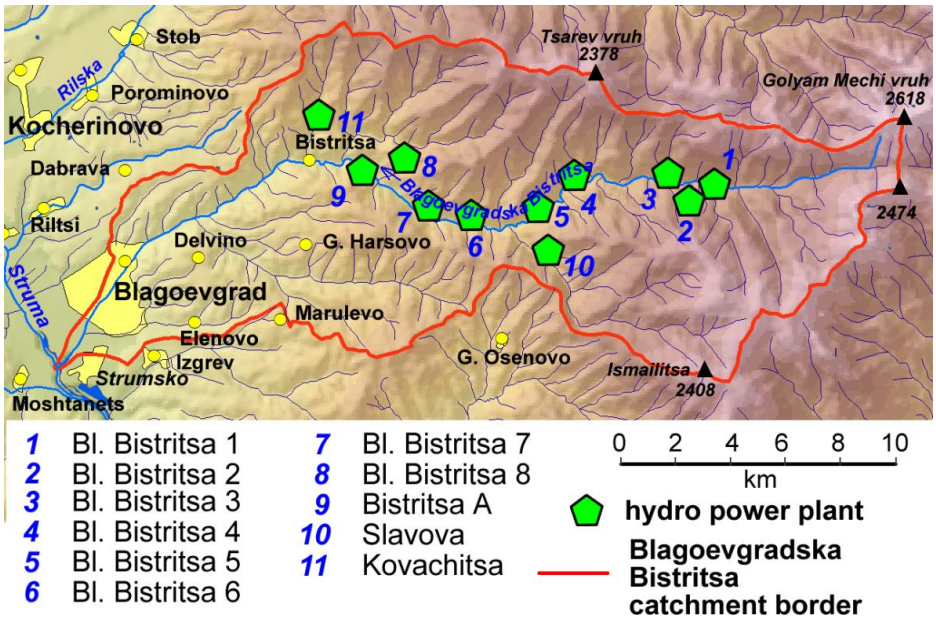


Figure 3-20: Hydro power plants in the catchment of Blagoevgradska Bistritsa river (current and former).

Solar energy

An STSsolar station has been operating on a parcel of land near the town of Blagoevgrad since 2011. The area of the work parcel is 3005 m^2. The station uses 432 monocrystal modules with a total area 551.5 kW, divided into 9 groups, each group comprising 48 modules. The modules are supported on aluminum rods, the latter also being part of station's grounding system. The photovoltaic station is equipped with a Sunny Web Box device, through which the station is monitored and controlled. Power supply is done through an UPS. A photovoltaic station on a building roof in the town of Blagoevgrad is operated by Polytransfer Electric Ltd.

Heating

Except electricity, timber and coal are traditionally widely used for heating in Blagoevgrad and the villages around Rila Mountains. The available statistical data show that timber is the second greatest source for the household heating, and coal is on the third position respectively (Table 3-18). As it is seen, gas is still not widely used for heating purposes in households.

Table 3-18: Number of households in Blagoevgrad municipality according to the source of energy for heating (data: Blagoevgrad Municipality, 2016).

Heating source	Number of households	Share (%)
Electricity	11,685	37.01
Timber	11,558	36.61
Coal	7,636	24.19
Gas from a central source	296	0.79
Propane-butane	273	0.76
Pellets	107	0.34
Diesel fuels	61	0.19
Total	**31,571**	**100**

As it can be seen, the energy consumption balance of the town of Blagoevgrad on one side, and the surrounding villages, on the other, differ greatly (figure 3-21). This has however a little effect on the summarized data presented on table 3, due to the negligible share of rural population as part of the total (especially when focusing only on the territory of Blagoevgradska Bistritsa river catchment), but it is quite indicative of the fact that traditional heating practices are still strongly maintained in small villages. There timber still totally predominate as an energy source for household heating.

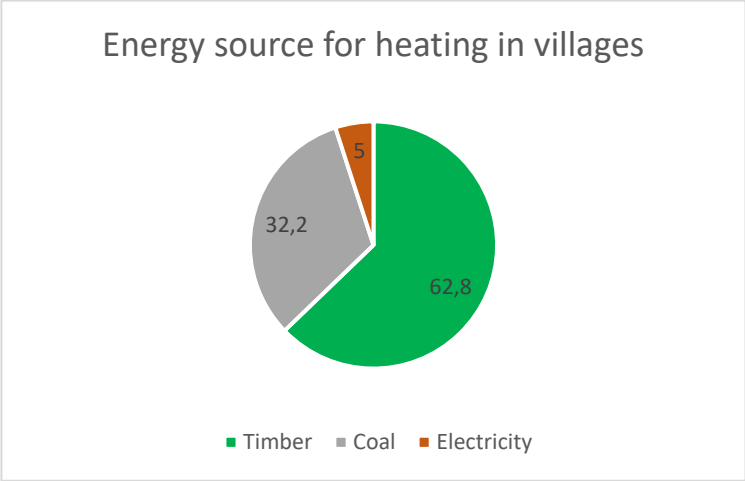


Figure 3-21: Share of the energy sources used for household heating: average for the villages in Blagoevgrad Municipality (data: Blagoevgrad Municipality, 2016)

This data can be accepted as sufficiently representative for the catchment of Blagoevgradska Bistritsa, as the town of Blagoevgrad and the five villages in the catchment house 93% of the population of Blagoevgrad Municipality. Since 2012 a steam generator fueled by direct burning of plant and animal biomass with a condensation turbine has been in operation in a yard in the town of Blagoevgrad. Operator is the company Rubin-8 Ltd.

Within the National Park timber extraction is strongly limited only to sanitary and prevention cuts (in cases of calamities or forest fires), while in reserve territories it is strictly forbidden. Timber remains the main heating fuel in mountain huts, but its consumption can be neglected due to the very small number of buildings and people that reside and accommodate within the park's territory, if looked in general.

According to data presented by Blagoevgrad municipality, the average amounts needed for the heating of a single household are as follows: 5.22 tons of coal, or 3.98 tons of timber for a year. On this base the average consumption of solid fuels for heating has been calculated to be around 4.47 tons/year. 91,160 tons of solid fuels were exhausted in 2014, of which 81,884 tons in the town of Blagoevgrad itself (Table 3-19) (Blagoevgrad municipality, 2016).

Table 3-19: Solid fuels consumed for heating in Blagoevgrad municipality for 2014 (data: Blagoevgrad municipality, 2016).

location	Timber [tons/year]	Coal [tons/year]	Total [tons/year]
Blagoevgrad	43,601	38,283	81,884
The 25 villages in the municipality	5,543	3,733	9,276
total	**49,144**	**42,016**	**91,160**

Gas is the predominant source for heating in administrative and social buildings: schools, kindergardens, specialized administrative buildings (Table 3-20).

Table 3-20: Sources for heating for buildings with social and administrative functions in the town of Blagoevgrad (data: Blagoevgrad municipality, 2016).

Type	Source for heating		
	Gas	Diesel	Electricity
Schools	19	4	1
Kindergardens	11	4	3
Baby-sitting kindergardens and kitchen offices	3	3	3
Other social facilities	0	5	10
Administrative buildings	5	0	1
Total	38	16	18

The consumption of solid fuels for the local industry in the town of Blagoevgrad is around 1/60 of what is used in households (derived by data from Blagoevgrad municipality, 2016). According to data from the Bulgarian Ministry of Energetics (Thermal Map of Bulgaria) the total annual amount of heat energy supplied to Blagoevgrad municipality in recent years accounts to about 253.57 GWh, of which 180.42 GWh to household users, 23.37 GWh to users in the social and service sector, and 49.79 GWh to the industrial sector.

Electricity distribution Infrastructure

Supply of energy is accomplished via intra-system station 400/110 kV. A 400 kV wire line between the electricity distribution stations in Blagoevgrad and Thessaloniki associates the electricity distribution networks of Bulgaria and Greece. The supply of electricity to the town Blagoevgrad in not optimal. The supply sources: the 400/110kV electricity distribution station of Blagoevgrad and two lower level 110/20kV stations, are all situated in town's southern and western parts. The two 110/kV stations do not have enough power to satisfy the future energy needs (Blagoevgrad Municipality Management Plan, 2014-2020). Supply of electricity is conducted by the CEZ Group Company.The street lightning has been completely renovated, with an introduction of energy-saving light bulbs.

For the last two decades the rates of energy consumption per household unit in Bulgaria have been gradually rising (figure 3-22). According to the data by the National Statistics Institute of Bulgaria, since 2010 the average monthly consumption of energy per household has been above 300 kWh, in winter months reaching nearly 400 kWh.

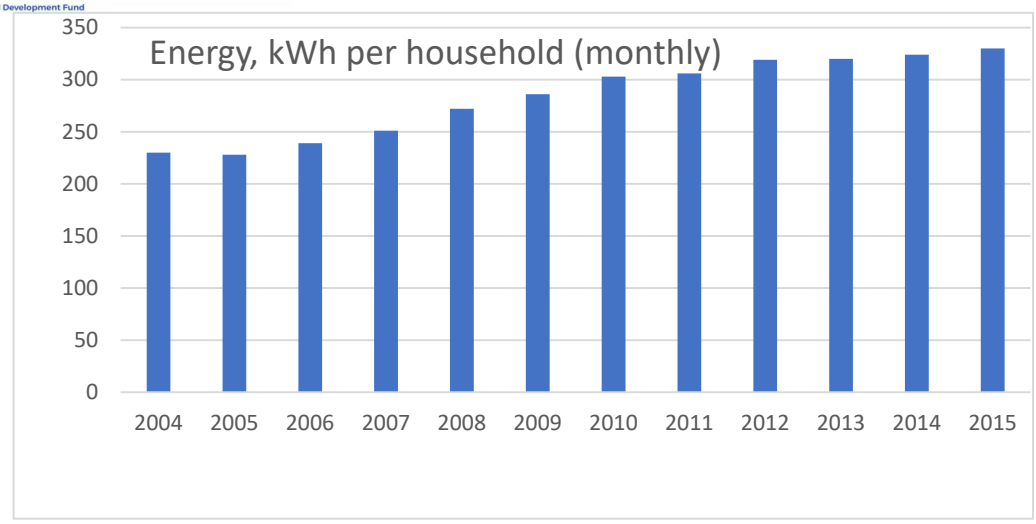


Figure 3-22: Average monthly consumption of electricity per household in Bulgaria for 2004-2015 (National Statistic Institute of Bulgaria, Zahariev et al., 2016).

For the approximately 30,000 household units in the town of Blagoevgrad (Population Census, 2011; GiudeBulgaria) and its adjacent villages within the catchment of Blagoevgradska Bistritsa the gross annual energy consumption for recent years (2016-2017) for households can be assessed to about 115,464,000 kWh.

Gasification

The town of Blagoevgrad has gas distribution infrastructure. Supply of gas is performed from the highway gas line Bulgaria-Greece. The connection to the town's network is done via the station at Pokrovnik village through a 7.5 km long supply gas line. Enlargements of the network are planned in the town itself, and also towards the planned industrial zones.

The construction and management of the gas distribution network on the territory of the Region "West" in Bulgaria (with the town of Blagoevgrad as its centre), is done by the company "Rila gaz EAD", owned by the Italian group ACEGAZ-APS, with the support of the Municipality of Blagoevgrad. By 2011 the total length of the gas distribution network in the town of Blagoevgrad reached 58 km, and by 2013 it was increased to a total of 89 km.

Forecasts on energy balance

According to the Forecast for electrical energy balance of Bulgaria by the year 2025 (New Bulgarian University, 2015) the country as a whole will not need new energy production facilities at least in the following decade. The energy consumption is expected to decrease because of both the shrinking population and the better energy management of the buildings: sanation, greater energy efficiency in manufacturing (it is a fact that Blagoevgrad and the region were leaders in number of sanated buildings under the National Energy Efficiency Programme for 2017, news.bg). The export is also expected to keep around the current levels, if the facilities of Kozloduy Nuclear Power Plant are maintained, and the main coal plants turn on gas. The current production rates are sufficient to meet the consumption, which on total is expected to drop by 5.89 % by 2025.

In the following years a considerable increase of energetic efficiency is expected for Bulgarian economy and households, thanks to the mass introduction of energy saving technologies. The decreased energetic intensity (the ratio between the energy consumption and the physical volume of GDP for a year) will allow 27% increase in GDP while decreasing the gross consumption of energy by 2.3 TWh (Forecast for the electrical energy balance of Bulgaria, New Bulgarian University, 2014).

On this base the future construction of large facilities is not considered necessary. Only the construction of photovoltaic installations is accepted as useful, mainly as roof constructions on newly constructed buildings. However, the price of the electricity is expected to rise by about 25% until year 2025, compared to price levels in 2018 (Forecast for the electrical energy balance of Bulgaria, New Bulgarian University, 2014; cez.bg).

On a more local context, concerning the Rila National Park and the area of Blagoevgradska Bistritsa, some decrease of hydro energy potential is expected in the following years and decades. This is related to the climate change trends, which have been observed recently, and which are forecasted for the future.

In the high parts of the Rila Mountains the average annual air temperatures for the period 1979-2008 are by 0.8°C higher than the standard period 1961-1990 (according to the data from the climatic station at Musala peak, Velev, 2010; Stringmeteo), which is close to the globally observed change (IPCC). Temperature rise has even accelerated in the last decade. Temperature rise results in a higher evaporation, especially in summer, and in a decrease of snow cover thickness, the number of days with snowfall (Grunewald et al., 2010), and the duration of the period with snow cover in the cold part of the year.

Conclusions

The territory of Rila National park possesses one of the highest potentials in Bulgaria for producing hydro energy. Some conditions exist for the production of renewable energy, mainly solar energy, which, due to the remoteness of the area from consumption centres, are not considered beneficial to exploit, except for satisfying part of the domestic needs of mountain lodges and winter sport facilities. At the same time, the relatively small extent of the territory, and the high protection status seriously limit the possibilities to produce energy. The truth is that, given the fact that Bulgaria is not at all in urgent need for developing new energy production facilities, the high mountain environments of Rila are much more valuable as a protected area with their natural heritage than as a vital source of energy. At present there are few small to medium hydro power plants operating within park's borders. They are usually components from cascades, which much larger parts lie outside the protected area.The hydropotential in the valley of Blagoevgradska Bistritsa is used through the 11 small hydro power stations, which have been operating in the last decade. Only two of them are situated within the borders on Rila National Park. Except the hydro power, negligible energy amounts are produced in photovoltaic stations in the town of Blagoevdrad (roof stations).
There is almost no energy consumption in Rila National Park, due to the lack of settlements and industry. The town of Blagoevgrad and its adjacent villages, which belong in the catchment of

Blagoevgradska Bistritsa, rely mainly on the supply of energy from the National Energy Distribution Network. Among other energy sources, coal and timber are still widely used for domestic heating. However, already more and more households are starting to rely on gas for heating, cooking and other purposes. Statistics for the past two decades have shown a gradual increase of energy consumption per capita and per household. Forecasts for the near future however outline trends for the long-term decrease of the same, due to the depopulation and the introduction of energy saving technologies.

3.2.3 Transport activity

3.2.3.1 Transport and communication infrastructure for the catchment area of the Blagoevgrad Bistritsa River

The territory of Blagoevgrad Bistritsa River is characterized by favorable transport and geographic location close to the Bulgarian capital and two international borders - the Republic of Macedonia and the Hellenic Republic. Its accessibility is achieved through a well-developed transport infrastructure along the Struma valley, whose catchment belongs to the studied area. In the meridional direction there pass the European transport corridor № 4 from Vidin via Sofia and Kulata to Thessaloniki (with E-79 international road, on which route lies the Struma Motorway which is still under construction) and Sofia-Blagoevgrad-Thessaloniki-Athens railway line. The direction of the international transport corridor № 4 is the shortest distance between the ports of the Danube - Vidin and Lom and the port of Thessaloniki on the Aegean Sea. Its advantages for freight and tourists are great because it gives the most direct connection to and from Athens in Greece. It provides the Republic of Greece with access to the European system of internal roadways and also an opportunity for access to the Baltic Sea. Moreover, the region is a competitor of the transport corridor along the valley of the Vardar River linking Belgrade with Thessaloniki, which before the accession of Bulgaria to the European Union was considered as the main transport corridor providing the link between Greece and the EU countries. In the northwest of the studied area, the transport corridor crosses Corridor № 8 via the E-80 international road connecting the ports of Varna and Bourgas and the Black Sea Basin with the Western Balkans via Skopje to Tirana. The nearest airports are in Sofia (110 km) and Thessaloniki (200 km). There is no waterborne transport in the studied area. The nearest port is Thessaloniki. The Blagoevgrad Municipal Center (with population of 192 374) is situated in the valley of the Struma River and the Blagoevgrad Bistritsa River, at 360 - 400 m above sea level, in the immediate vicinity of the southwest slopes of the Rila mountain, on the main road E-79, 102 km south from Sofia. The town is 25,3 km from the border with the Republic of Macedonia, 100 km from the Greek border and about 200 km from the city of Thessaloniki.

Depending on its anthropogenic load and its transport absorption and accessibility, the conditional catchment of Blagoevgrad Bistritsa can be divided into three zones:

The first zone covers the lower part of the catchment area of Blagoevgrad Bistritsa with the river Struma. It is best transported due to the character of the relief. There is a valley extension, where the district and municipal center of Blagoevgrad is located with the districts Strumsko, Izgrev, Elenovo and the village of Byalo pole. There is a connection between them via asphalted roads and streets, as well as through the railway line on which there is one station in Blagoevgrad and 2 stops in Byalo pole and Strumsko. Here, the density of road infrastructure is the highest and the communication with the water basin is realized from here. This area is also the most anthropogenic. The transport service of the municipality is presented in table 3-21 according to the category of road from the national road network, presence of a railway station, stop and border checkpoints.

Table 3-21: Road and rail transport services; presence of border checkpoints.

Municipality			
	Road transport	RW stations and stops	Border checkpoints
Blagoevgrad	Road I and III class	1 station and 2 stops	1 border checkpoint

The second zone includes recreational, sports and forestry activities in the catchment area. It covers the out-of-town park of Blagoevgrad - "Bachinovo", the tourist area around Bodrost village with Kartalska polyana and the lands of the villages of Bistritsa and Dolno Harsovo. The transport infrastructure consists of asphalted municipal roads linking the municipal center with the settlements, roads with crushed stone cover, forest roads with soil coverage, paths without marking and cabin cableway. The communication is realized through personal cars, municipal buses, trucks and others. The density of the road network here is not high.

The third zone covers the upper valley of the catchment, which includes the protected areas of the Rila National Park and the Parangalitsa Reserve. On the territory of the Rila National Park, the roads have crushed stone, forest roads with soil coverage and tourist trails with red, blue and yellow marking. There are no marked paths in the Parangalitsa Reserve due to the status of the protected area. There are narrow and short paths through which a scientific cognitive and educational activity can be carried out.

The total length of the asphalt, crushed stone and soil roads in the catchment are presented in Table 3-22, and those that are only in the protected area of the park in Table 3-23.

Table 3-22: Length of roads in the Blagoevgrad Bistritsa basin according to the type of cover.

Road Surface	m	km
Roads with asphalt coverage	79 563.7	79.6
Soil coverage – forest roads	107 251.1	107.3
Crushed stone coverage	34 989.2	35.0

Table 3-23: Length of the roads on the territory of Rila National Park within the Blagoevgrad Bistritsa basin according to the type of cover.

Road Surface	m	km
Soil coverage– forest roads	22 813.6	22.8
Crushed stone coverage	16 735.5	16.7

The data is generated from the GIS layer in the Rila National Park Management Plan 2016.

The types of transport developed or under development in the surveyed territory are: road, rail, cable and pipeline.

Autotransport and infrastructure

By reference to the Traffic Police, in the first quarter of 2018, 167 141 vehicles were registered - for the entire Blagoevgrad District, and trailers were included in the number. The roads from the Republican Road Network.

The Republic Road I-1 is a first-class road from the Republican Road Network of Bulgaria. It is the most western of the first-class roads with the main north-south direction and connects with the border crossing point Kulata - Promahon, crossing the studied area. Its total length is 453.8 km, the road being interrupted by the constructed section of the Struma Motorway, which in the future should replace it in the southern part of its route. Route I-1 is the second longest Republican road in Bulgaria after Republican Road I-6. The road is part of the European road E79 Oradea - Craiova - Vidin - Sofia - Thessaloniki.

At its starting point at Vidin, the Republic Road I-1 is connected to the Romanian road network via the Vidin-Calafat Bridge. After the town of Dupnitsa the road follows the valley of the Dzherman River, and after the catchment - the Struma valley to Kulata - Promahon, where it connects with the Greek road network (road 63). In this section the road passes through Blagoevgrad, Simitli, Kresna and Sandanski. At the town of Simitli II-19 separates from it (for Ilinden - Eksohi border checkpoint).

Table 3-24: Deviations from the Republican Road I-1 in the studied area

Roads diverging to the right (settlement, road number, direction of the road)	Km	Roads diverging to the left (direction of the road, road number, settlement)
Municipality Blagoevgrad, District Blagoevgrad	359,2	District Blagoevgrad, Municipality Blagoevgrad
Belo pole village	360,6	→ Belo pole village, municipal road (for the village of Riltsi)
(to Logodazh border checkpoint) III-106, 0.0 km, Blagoevgrad ←	363,2	Blagoevgrad
(to the border with the Republic of Macedonia) III-1006, 0,0 km, Blagoevgrad←	364,7	Blagoevgrad

The first-class Republican road I-1 / E-79 / Blagoevgrad-Simitli-Kulata, serves mainly Blagoevgrad, Simitli, Kresna, Strumyani, Sandanski and Petrich with a 7.5 / 12m two-lane gauge. Through the Kulata border checkpoint, the international transport flows in the North-South direction and is the only border crossing point between Bulgaria and Greece in this part of the country, and bypass roads are built near the bigger settlements. Although not yet in compliance with European requirements for gauge, safety and comfort, it is included in the CBC programs with Greece and the financing of its modernization and reconstruction to the main gauge is ensured.

In order to track the traffic of cars, trucks and light motor vehicles, as well as motorcycles in this direction devices which count the vehicles are placed before and after Blagoevgrad (fig 3-23), which record all vehicles which pass through this section for the day and respectively for the year. These devices possess four-digit numbers and those serving the area are 2036 and 2073.

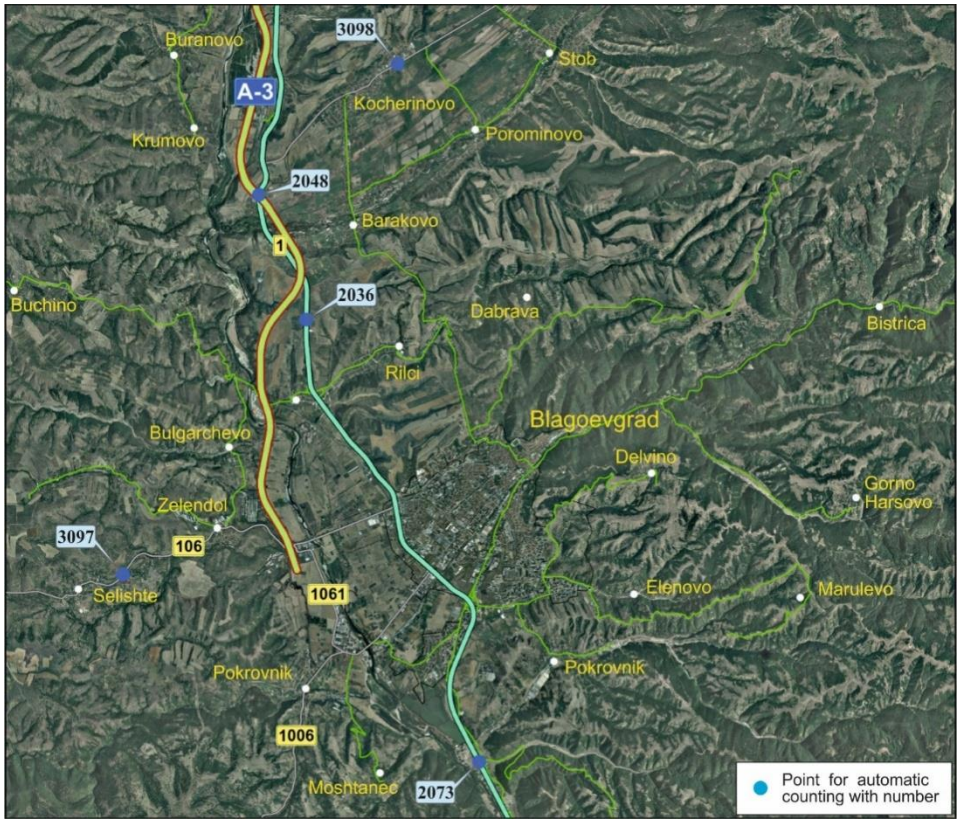


Figure 3-23: Road E-79 end point for automatic counting.

The road link III-106 Blagoevgrad-Stanke Lisichkovo-Delchevo / Macedonia / is of local importance. This is a third-class road, part of the Republican road network of Bulgaria, on the territory of Blagoevgrad District, Blagoevgrad Municipality. Its length is 25.3 km. The road turns right at 363.2 km on the Republican Road I-1 in the northwestern part of Blagoevgrad and goes west through the Blagoevgrad valley. It crosses the Struma River and through the village of Zelenol and starts climbing through the northern part of Vlahina Mountain. It passes through the villages of Selishte, Logodazh and Obel, and reaches the Logodazh border checkpoint, from where it continues in the Republic of

Macedonia as road No. 5 of the Macedonian road network. After the Struma River Bridge, 2.3 km to the left of it, there is the Republican Road III-1061 (3.7 km) for the village of Pokrovnik.

The Republican Road III-1006 is a third-class road, part of the Republican Road Network of Bulgaria, on the territory of Blagoevgrad District, Blagoevgrad Municipality. Its length is 25.1 km. The road turns right at 364.7 km of the Republican Road I-1 in the southwestern part of the town of Blagoevgrad and is directed southwest through the Blagoevgrad valley. After about 2 km the road crosses the Struma River, passes through the village of Pokrovnik and continues in the southwest direction as it gradually begins to ascend on the slopes of Vlahina Mountain. After crossing the village of Padesh and reaching the village of Gabrovo, the built road ends. From there to the border with the Republic of Macedonia on the ridge of Vlahina mountain the road is in a project and along the 6 km it is a field (forest) road.

The Republican Road III-1061 is a third-class road, part of the Republican Road Network of Bulgaria, passing through the territory of the Blagoevgrad region, Blagoevgrad Municipality. Its length is 3.7 km. The road turns left at 2.3 km of the Republican road III-106 road just after the bridge over the Struma River and goes south along the right bank of the river. After 3,7 km it reaches the eastern part of the village of Pokrovnik, where it connects with the Republican road III-1006 at its 3,9 km. The roads of the RRN, conducting the main road traffic on the international routes, do not meet the European requirements for gauge, safety and comfort of travel.

Table 3-25: Density of the road network

Municipalities	Density of the road network / км /1000 км^2/					
	I class	II class	III class	Total RRN	municipal road network	total
Blagoevgrad	22	-	77	99	191.3	290.3
Blagoevgrad District	13.5	24	63	100.5	167.1	267.7
Republic of Bulgaria	27.1	34.5	107.1	171.6	161.4	333

According to data from the Regional Strategy for Regional Development

The Struma Motorway

On the periphery of the region of strategic importance is the overall building of the Struma motorway. It will increase transport accessibility in the surveyed territory, as at the moment it is happening from the capital to the regional and municipal center. The total length of the Struma Motorway, according to the MRDPW - from Daskalovo to the border with Greece is 156km. The motorway route is divided into four sections. Lot 1, 2 and 4 are in operation. Still under construction is Lot 3 from Blagoevgrad to Sandanski with a length of 62 km.

Lot 3.1 from Blagoevgrad to Krupnik includes the construction of a motorway from 359 + 000 to 376 + 000 km. It is divided into two sections - section 1 from km 359 + 000 to km 366 + 000/7 km / and section 2 from km 370 + 400 to km 376 + 000 / 5,6 km /. Between them the construction of the tunnel "Zheleznitsa" is planned.

The construction of bridge facilities, overpasses, agricultural subways, road subway, road junction "Blagoevgrad-South" and a big road junction near Simitli is planned. The length of the stretch is 12.6 km. The motorway will be with A29 gauge with two lanes. (*according to the Road Infrastructure Agency*)

Table 3-26: Exits of Struma Motorway - from Wikipedia

Exit	Destination	Note
	A6, Pernik,	In operation
	Studena	In operation
	Bosnek	In operation
	Staro selo	In operation
	Dolna Dikanya	In operation
	Dupnitsa-north	In operation
	Krushovitsa Tunnel	In operation
	Dupnitsa- south, Kyustendil	In operation
	Boboshevo	In operation
	Kocherinovo Tunnel	In operation
	Kocherinovo	In operation
	Blagoevgrad	In operation
	Blagoevgrad- south	Under construction to 2019
	Zheleznitsa Tunnel	Auction
	Simitli, Bansko	Under construction to 2019
	Krupnik	Under construction to 2019
lot 3.2	Kresna Gorge (Krupnik- Kresna)	Route design
	Kresna	Route design
	Strumyani	Under construction to 2019
	Sandanski	In operation
	Petrich, Melnik	In operation
	General Todorov	In operation
	Marikostinovo	In operation
	Petrich	In operation
	Kulata Border Checkpoint; Greece, A25 Thessaloniki, Athens	In operation

The construction of the Struma motorway will ensure the sustainable development of the road infrastructure in the country and will contribute to the integration of the national transport network

with that of Europe by strengthening the cross-border cooperation. The motorway will help safe passage of the traffic on one of the most critical stretches of the current route through the Kresna Gorge. There is a real risk of disturbance of the biodiversity in the area, as well as a change in the appearance of landscapes.

However, the whole completion of the motorway will provide a significant improvement of the road network in the country and will create conditions for enhanced cooperation between the Balkan countries. Completion is of strategic importance for the development of the regions and for direct access to the Aegean Sea.

The municipal road network serves traffic within the municipality of Blagoevgrad, part of which falls into the catchment area of the Blagoevgrad Bistritsa River. The majority of this network is in poor condition, making communication difficult, especially in winter conditions. The maintenance is carried out by the municipalities with funding from MRDPW. All settlements are connected to asphalt roads, but some of them are unpaved or paved in poor condition, making it difficult to access the sites they serve.

Table 3-27: List of municipal roads in the area.

№ By order	№ by	Road №	Name of the road	Length From km To km		Serviced Municipalities
1	*2*	*3*	*4*	*6*	*7*	*8*
1.	46.	BLG1066	/III-1006, Blagoevgrad-Pokrovnik/ -Blagoevgrad, Strumsko housing estate/I-1/	$0^{+000}+1^{+020}$	1st	Blagoevgrad
2.	47.	BLG1069	/BLG1071, Blagoevgrad-Simitli/ - Tserovo	$0^{+000}+5^{+600}$	1st	Blagoevgrad
3.	48.	BLG1071	/I-1 Blagoevgrad-Simitli/- Border municipality (Blagoevgrad –Simitli) – Simitli-Cherniche - /I-1/	$0^{+000}+8^{+700}$	1st	Blagoevgrad Simitli
4.	201.	KNL1084	/III-107/ Kocherinovo-Barakovo - Border municipality (Kocherinovo-Blagoevgrad) – Blagoevgrad /BLG2061/	$4^{+500}+9^{+200}$	1st	Kocherinovo Blagoevgrad
5	59.	BLG2060	/I-1, Dupnitsa– Blagoevgrad / - Riltsi - /KNL 1084/	$0^{+000}+3^{+600}$	2nd	Blagoevgrad
6.	60.	BLG2061	/I-1/ Blagoevgrad-Bistritsa - Bodrost – Kartala	$0^{+000}+27^{+330}$	2nd	Blagoevgrad
7.	61.	BLG2062	/I-1, Dupnitsa–			

			Blagoevgrad / -Belo pole - Buchino-Lisiya	$0^{+000}+15^{+000}$	2nd	Blagoevgrad
8.	62.	BLG2063	/BLG2061, Blagoevgrad-Bistritsa/ - Gorno Hursovo	$0^{+000}+5^{+000}$	2nd	Blagoevgrad
9.	63.	BLG2067	/BLG2072,Blagoevgrad-Elenovo/ - Izgrev-asphalt base	$0^{+000}+2^{+500}$	2nd	Blagoevgrad
10.	64.	BLG2068	/III-1006, Blagoevgrad-Pokrovnik/ -Moshtanets	$0^{+000}+3^{+600}$	2nd	Blagoevgrad
11.	65.	BLG2070	/III-1006, Pokrovnik-?Gabrovo/Padesh-Leshko-Gorno Leshko	$0^{+000}+5^{+100}$	2nd	Blagoevgrad
12.	66.	BLG2072	/I-1/Blagoevgrad-Elenovo-Marulevo	$0^{+000}+10^{+100}$	2nd	Blagoevgrad
13.	67.	BLG2073	/KNL1084,Blagoevgrad-Barakovo/- Dubrava-Demirevo ?	$0^{+000}+11^{+600}$	2nd	Blagoevgrad
14.	68.	BLG2074	/III-106,Blagoevgrad-Zelen dol/-Bulgarchevo-/BLG2062/	$0^{+000}+3^{+500}$	2nd	Blagoevgrad
15.	69.	BLG2075	/III-106, Blagoevgrad-Zelen dol/-Zelen dol – Gorno Bulgarchevo	$0^{+000}+2^{+600}$	2nd	Blagoevgrad
16.	70.	BLG2076	/III-106, Zelen dol – Logodazh/ - Drenkovo	$0^{+000}+3^{+500}$	2nd	Blagoevgrad
17.	50.	BLG3064	/III-1006, Padesh-Gabrovo/ - Debochitsa ?	$0^{+000}+9^{+000}$	3rd	Blagoevgrad
18.	51.	BLG3065	/BLG2072, Blagoevgrad-Elenovo/ - Delvino	$0^{+000}+4^{+500}$	3rd	Blagoevgrad
19.	52.	BLG3077	/III-106, Logodazh-Delchevo/ - Klisura	$0^{+000}+2^{+600}$	3rd	Blagoevgrad

Date: 09.03.2012 / with length of 129,550 km / Note: according to the municipality, requested in 03.2018 (1. The list of municipal roads has been approved by Decision №236 / 13.04.2007 of the Council of Ministers of the Republic of Bulgaria, 2. The list of municipal roads is in accordance with Article 3, paragraph 4 of the Roads Act. A map of the Republican Road Network. http://www.api.bg/index.php/bg/karti/republikanska-ptna-mrezha/

The length of the fourth-class road network in the municipality of Blagoevgrad is 132 km, which need maintenance and refreshment. The aim of the administration is to provide priority funds for the reconstruction and rehabilitation of roads leading to tourist sites.The transport and communication scheme of Blagoevgrad is radial-tangential, with the tangents (from east to west) in the northern part of the city very close. The primary street network (PUM) due to pedestrian changes has been interrupted at key locations and for the most part does not meet the requirements of the current regulations (loading, number, width of the street lane and sidewalks, etc.).

In the town of Blagoevgrad, the street network consists mainly of main streets - IV class, with a width of 7.0 and 12.0 meters. The length of the main street network is about 55 km and the total length of the street network in Blagoevgrad is about 135 km, maintained in a relatively good condition. There are 10 light-regulated junctions in the city. Circular crossroads are only 4, which due to the traffic load are extremely insufficient.

Table 3-28: Classification of PUM for Blagoevgrad

Class	Functional distribution	Number of lanes	Length of one lane (m)	Length (км)
II	City motorway	2+2	3.75	5.25
III	Regional road artery	2+2 (4)	3.50 (3.00)	22.8
IV	Main streets	2 (4)	3.50 (3.00)	26.5
TOTAL:				54.62

Source: ODA Blagoevgrad 2014-2020

For the traffic load of the Republican Road Network in the region of Blagoevgrad municipality data on average hourly traffic intensity (MV / h) published in the reports of the Road Infrastructure Agency are used.

Table 3-29: Average Hourly Intensity of Vehicle Traffic by Base Crossroads in Blagoevgrad for 2014.

Name point - crossroads		Number of vehicles, by the type		
		cars	trucks - diesel	Total vehicles /hour
1	Main road E79 – Blagoevgrad	907	449	1356
2	Sv.sv.Cyril and Methodius Blvd and Vlado Chernozemski Str. Черноземски	1218	92	1310
3	Sv.sv.Cyril and Methodius Blvd and Ilinden Str.	1159	74	1233
4	Vasil Levski Str and Vlado Chernozemski Str. Черноземски	1347	101	1448
5	Al. Stamboliyski Blvd and 14th polk Str.	1118	84	1202
6	Stefan Stambolov Str. – in front of II Primary School	732	47	779
7	Gotse Delchev Square	740	56	796
8	Ivan Mihaylov Str. and Vlado Chernozemski Str.	838	54	892
9	Polkovnik Drangov Str. and Nikola Vaptsarov Str.	716	38	754
10	Dimitar Solunski Blvd and Sv.sv. Cyril and Methodius Blvd	1237	93	1330
11	Railroad in Staro Strumsko district	578	64	642
12	Vasil Levski Blvd- in front of the High School of Textile	587	73	660
13	Vasil Levski Str. and Dimitar Solunski Blvd	937	81	1018
14	Dimitar Solunski Str. – in front of Voroshilov factory	1032	115	1147
15	14th polk Str.	811	43	854
16	Yane Sandanski Str.	709	45	754

17	Aleksander Stamboliyski Str.	742	46	773
18	Grigor Purlichev Str.	761	24	785
	Total	**16169**	**1579**	**17733**

According to data from the Program for Reducing Harmful Emissons in the Air to the MoEW

The data presented in the table show that in the fleet the share of light and light commercial vehicles is relatively high - 91% of all cars. As for the whole country as well as Blagoevgrad municipality it is characteristic that the structure of a fleet by type of cars and used fuel is constantly changing. The relative share of light (LA) and light-commercial (LC) diesel vehicles vs. those of gasoline engines is growing fast. The relative share of gas-fueled cars is decreasing. Almost 100% of heavy vehicles (TA) and buses (Auto) use diesel fuel. (under Program Update .....)

Table 3-30: Basic traffic on the roads of Blagoevgrad in 2017

№	Code	Official name	Length	Traffic
	name		км	vehicles/hour
1	L1	Road I-1	13.35	1182
2	L2	Road III-106	1.95	123
3	SLINE1	Sv.sv. Cyril and Methodius	0.70	1100
4	SLINE2	Vasil Levski Blvd	1.65	1240
5	SLINE3	Al.Stamboliyski I Str.	0.75	1020
6	SLINE4	Stefan Stambolov Str.	2.78	512
7	SLINE7	Ivan Mihaylov Str.	1.74	722
8	SLINE8	Sv. Dimitar Solunski	2.65	1329
9	SLINE9	14th Polk Str.	1.76	850
10	SLINE10	Yane Sandanski Str.	1.84	1020
11	SLINE11	Vlado Chernozemski Str.	1.20	1100
12	SLINE12	Al. Stamboliyski II Str.	1.85	1120
13	SLINE13	Hristo Tatarchev Str. (Gotse Delchev Square)	1.83	796
14	SLINE14	Grigor Purlichev	1.39	785
15	SLINE15	Ilinden Str.	0.76	740
16	SLINE16	Marinov Str.	0.59	850
17	SLINE17	Osvobozhdenie Str.	0.95	724
18	SLINE18	Peyo Yavorov Blvd	2.38	650

According to the data provided by the Municipality of Blagoevgrad for 2018

According to data for 2018 from the municipality, to reduce traffic in the central parts of the city a blue zone is established. The city's operating data is insufficient and unsystematic.

Area capacity - 800 cars;

Average parking distance in the area - 1 km

Average time of stay - 1 h

Average number of parking per day - 4000;

Active time - 16 h / d

SMS payment for the Blue Zone in Blagoevgrad is now available and functional, allowing drivers to pay for the stay of their cars by SMS at short number 1373 for all mobile operator. In order to make the payment, the SMS must contain the registration number of the car, written in latin, without spaces. For each valid message, drivers are confirmed to have successfully paid and can park in Blue Zone mode. Ten minutes before the payout period expires, senders will receive a reminder message with an option to extend their stay. The price of the service is BGN 1 with VAT and the possibility to purchase traditional parking tickets also remains (*according to the municipality*).

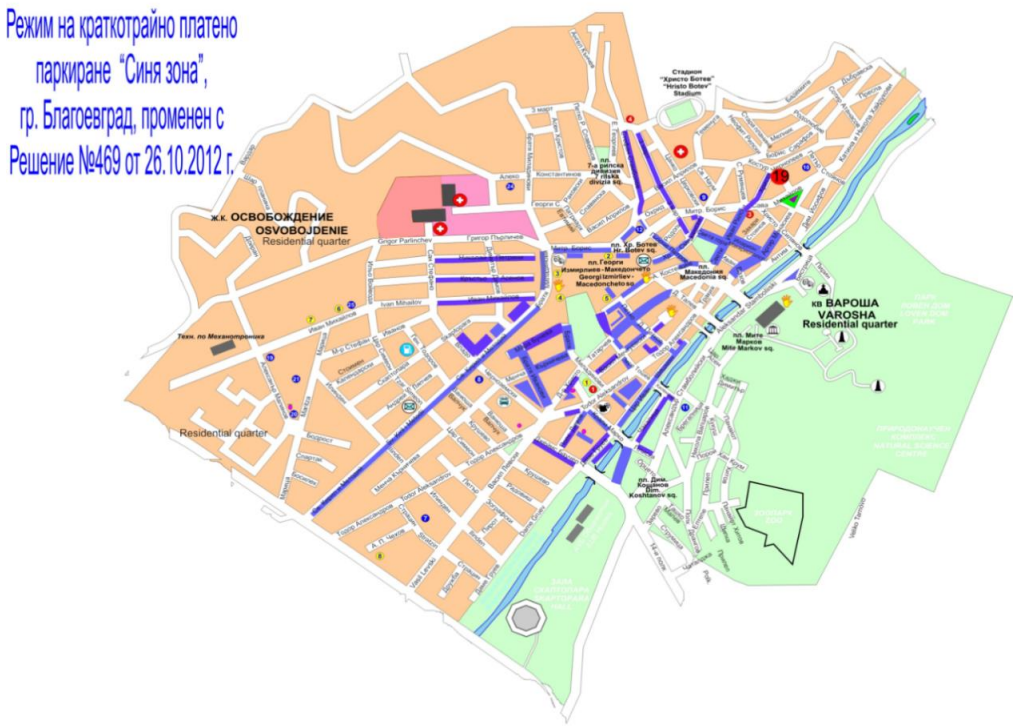


Figure 3-24: A schema of the configuration of the street network and the scope of the blue zone in Blagoevgrad.

Municipal Bus Transport

Blagoevgrad has municipal bus transport. It is implemented by the companies Bistrica 96 Ltd. and Traffic Services Ltd. It could be divided into three groups: bus lines serving the city (5), bus lines serving industrial plants and the production area (2) and bus lines serving the neighborhoods of the city and the nearby villages (3). The connections between the individual residential areas are ineffective and there is a lack of good connection with the town's hospital. On the map whose link is displayed, you can track the routes of existing bus lines:
https://www.google.com/maps/d/viewer?mid=1mbPyB1lSH1hrZ45Aq3gmk15Mpno&ll=42.01343726384206%2C23.090792851867718&z=16

Coach Bus Transportaton Services

Blagoevgrad Bus Station is the main starting point for arriving and departing buses in the city. The address of Blagoevgrad Bus Station: 23, Sv. Dimitar Solunski Bulvd. The phone of Blagoevgrad Bus Station: 073 / 884-009. Working Hours: 08:00 to 18:00 at the Ticket Office phone - 0889808545. Website:http:/www.avtogara-blagoevgrad.info/

Figure 3-25: Blagoevgrad Bus Station.

Blagoevgrad Bus Station departs buses on different routes, reaching all over Bulgaria. More important bus lines are: Blagoevgrad - Sofia; Blagoevgrad - Dupnitsa; Blagoevgrad - Petrich; Blagoevgrad - Sandanski and Blagoevgrad - Gotse Delchev.

Taxi transport

Taxi transport in Blagoevgrad as of 16.03.2018. is carried out by 424 taxi cars. The city is served by several taxi companies:

-"T.M. 13 "

- "Filios DE" Sole Member Ltd.

-Sole Trader “Mihail Chifligarov”

-“Dynamic – 11” Sole Member Ltd.

-Sole Trader "Stoyan Strayanov - DS"

-“Desita - Desislava Hristova” Sole Member Ltd.

-"Kety 2013" Sole Member Ltd.

-"Mega Chance - M - 2001" Ltd. (Phone: 073/88 22 22)

- „Ecotaxi – Blagoevgrad“ Sole Member Ltd.

-Sole Trader „Nikolay Mladenov“

-Sole Trader „Nikolay Minchev– Niki – B“

-„BB1 Trans“ Sole Member Ltd.
-Sole Trader„Silvana- Rumen Glavev“
-„Kikos 2016“ Sole Member Ltd.
-Sole Trader „Vlast – Vladimir Filadev“
-„Dinamic – 11“ Sole Member Ltd.
-Sole Trader „Angel Atanasov – AAE“
-„Zho и Ko“ Ltd.
-„Velev 2013“ Sole Member Ltd.
-„Speedy Taxi“ Sole Member Ltd.
-„Prodigy – Invest“ Ltd.
-„VM – Planina“ Sole Member Ltd.
-Sole Trader „Borislav Keremidchiev“
-Sole Trader „Ivan Vodenicharov – Kiko – Kiril Vodenicharov“
-„Niki 2809“ Sole Member Ltd.
-„Volf 91“ Sole Member Ltd.
-„Mega lux – D“ Sole Member Ltd. (*according to the data from Blagoevgrad municipality from 2018*)
A transport map: http://www.blagoevgrad.eu/spravochnik/transportna-karta-na-blagoevgrad

Railway transport

Through the territory of the Blagoevgrad district and through a part of the studied area a V main railway line passes - Sofia-Blagoevgrad-Kulata with a length of 93 km / in the section Byalo pole-Kulata. The railway line Sofia-Kulata is categorized in the European network for motorway railway lines under No 885 and the European Combined Transport Network (CE-885). The line is important in international and Balkan terms, because it is the shortest railway connection between the port of Vidin / Lom / on the Danube and the port of Thessaloniki on the Aegean Sea. The railway border crossing is through the Kulata border checkpoint in Bulgaria and the Promahon border checkpoint in Greece.

There are 10 stations and 10 stops for passengers and freight services along the route from the village of Byalo pole to Kulata. The stations with the largest passenger and freight traffic are Blagoevgrad, Simitli, Kresna, Strumyani, Sandanski, Gen. Todorov and Kulata. (*according to the data provided by the Regional Development Strategy*). The railway line passing through the area is single and with a normal gauge (1435 mm). It was fully electrified in 2001. The maximum speed from Kocherinovo to Blagoevgrad is 70 km / h, and from Blagoevgrad to Cherniche tunnel is 75 km / h.

Table 3-31: Blagoevgrad Railway Station – arrival – departure rails.

Name of station	Arrival-departure rails (ADR)			Security installation
	Number of ADRs	Maximal useful length	Minimal useful length	
Blagoevgrad	5	577	512	ETs-M

Figure 3-26: Blagoevgrad Railway Station.

The line was completed in 1944 but due to the evolving military-political events it was not opened for regular operation, even a part was dismantled in 1945, which interrupted the railway connection between Bulgaria and Greece until 1965.

The distance from Sofia to Blagoevgrad is about 101 km and it takes 2 hours 40 minutes. All passenger and fast trains from and to Sofia - Central Railway Station stop at Blagoevgrad station, as well as passenger trains to Kresna, Sandanski and Petrich, as well as between Dupnitsa and Kulata. The international train Sofia-Thessaloniki-Sofia stops at the station. Directions from Blagoevgrad to Sofia and from Blagoevgrad to Petrich are served daily by 16 trains, 10 of which are passenger, 5 fast and 1 international. The first train leaves at 05:25 and the last one is at 19:00. (*according to the station manager)*

Cable transport

This mode of transport is used to transport cargo and people by ensuring that they move to places that are inaccessible through other technologies and at the same time reduces environmental impact. On the left slope with northeast exposure from the catchment area of Blagoevgrad Bistritsa

is built the passenger rope line with a length of 3000 m. The construction in the land of Bistrica village started in 2007, and the official opening was on 30 December 2009. It is located in Kartala locality in close proximity to Rila National Park and Parangalitsa Reserve 3 km from Bodrost resort. The capacity of the six-seat cabin lift is 1400 people per hour, overcoming the difference in height for about 15 minutes. It has a circular motion and detachable booths. It is produced by Leitner-Poma, second-hand by Meransen (Italy) (1982). The lower station starts at 1420 m above the sea level in the Kartala area (Kartalska polyana) and the upper station is at 2245 m the Ravnets locality. The starting point to the lower station is the Bodrost resort 3 km along the asphalt road, the village Bistritsa - 19 km along the asphalt road and Blagoevgrad 31 km along the asphalt road. For the upper lift station, the starting points are Mount Ismallitsa (Ravnets) 2408 m., Macedonia hut, Dobarsko hut, Chakalitsa hut and the ski run. The upper station of the lift is located on the mountain ridge, where you can enjoy a magnificent panoramic view of the Pirin and Rila Mountains. The main purpose of the cabin lift during the ski season is to serve the Kartala Ski Center. The Kartala mountain resort offers several runs all year round to its visitors, the main one being 4,500 meters long and can be described as medium difficulty or "red". The slopes are also serviced by a ski lift, a "plate" type, with a length of 1300 meters and a capacity of 700 people per hour, as well as a ski lift for beginners with a length of 300 meters and a capacity of 500 persons per hour. During the winter ski season 2017-2018, the cabin lift does not work because of a scheduled repair.

Figure 3-27: Rope line – Cabin lift

Pipeline Transport

This type of transport consists of a motorway gas pipeline through which Blagoevgrad is supplied with gas. The connection to the city network is through the station in the village of Pokrovnik through a supply pipeline of 7.5 km. Extensions of the network are foreseen both in the city and in future industrial and other companies under the Master Plan.

Rila Gas EAD is the company owned by the Italian group ACEGAZ-APS, established with the purpose of building and managing the gas distribution network on the territory of the West region in Bulgaria with the center of Blagoevgrad. This initiative is implemented with the assistance of the municipalities managing each separate administrative area. The gasification program of Rila Gas EAD includes designing, construction and assembly works in 25 cities, including Blagoevgrad, Vratsa, Pernik, Sandanski, Ihtiman, Dupnitsa and Radomir. The construction of 870 km of gas distribution

network and 150 km. Deviations are planned.

Table 3-33: Gas distribution network of Blagoevgrad - the construction works started in 2007

Stage of implementation of the project as of January 2013		
Built network:	89 км	Of total: 100 км
Putting into operation of 58 km. network :		November 2011

Source: Rila Gas EAD

3.2.3.2 Tourist Routes in Rila National Park

Blagoevgrad is the starting point for the Parangalitsa Reserve and Rila National Park. Close to the central part of the town at Varosha complex is an asphalt road that follows the valley of the river. It runs parallel to the valley flow. It passes to the right along the entire Bachinovo Park, through the village of Bistritsa, reaches the forest house Slavova at the catchment of the Slavova River, then turns north-east and reaches the Bodrost tourist complex. Its ultimate destination is the lower station of the cabin lift in Kartalska Polyana. The total length of the asphalt road is 31 km. During the summer season, it is served by a municipal bus service (Friday, Saturday and Sunday at 8.00 am from Blagoevgrad railway station) from Blagoevgrad to Bodrost resort. After Kartalska Polyana, the road continues to reach the boundary of the park and inward to the catchment, but it is already with a crushed stone coverage. After the catchment it continues to Macedonia hut as a land-based road surface. The length of the route from Bodrost to Macedonia hut is 10.2 km. The Mechi Pass passage ends in the catchment ending, from where it descends to the neighboring catchment of the Mesta River through the left and the Dinkov dol valley. This is a water catchment between the two catchments of the Struma River and the Mesta River. On it Macedonia hut is located, from which many tourist routes and trails go. The hut of Macedonia is situated in the Southwest Rila on the saddle between the peaks of Goliam Mechi peak 2617m above the sea level and Little Mechi peak 2474 m above sea level, at an altitude of 2170 m. It was built in 1937 under the name of "Aigidik", later "Stanoi Krekmanski", from 1980 - "Macedonia" hut. It is also a point of the European route E4. To it and to the higher parts of the park one can also reach from Semkovo summer resort. The path has a blue mark and the distance is 2.30 hours. At almost equal distances are the exit points from the village of Dobarsko, via Dobarsko hut to Macedonia hut - 4.30 hours on the blue mark as well as Bodrost, the upper station of the cabin lift on the ridge between Mount Ravnets 2408m and Little Mechi peak 2474m also for 4.30 hours on red markings. The classical route from Bodrost hut to Macedonia hut on a blue-marked path has a duration of 2.50 hours and a length of 8, 1 km. The length of the marked hiking trails in the water catchment area and beyond is shown in the following tables:

Table 3-34: Length of the marked hiking trails in the basin of the Blagoevgrad Bistritsa River

Route	m	km	Colour of the marking
Bodrost – Makedonia hut	10 183.0	10.2	Blue
Makedonia hut – Predel	11 066.6	11.1	Red
Makedonia hut – Ribni ezera (Fish lakes)	1 517.9	1.5	Red
Makedonia hut – Dobro pole – Mandrata	19 387.1	19.4	Yellow
Chakalitsa – Skachkovets	4 683.0	4.7	Blue
Slavova – Chakalitsa hut	7 372.8	7.4	Red
Unmarked paths	2 865.0	2.9	No marking

Table 3-35: Length of the marked hiking trails on the territory of the Rila National Park, part of the basin of Blagoevgrad Bistritsa.

Route	m	km	Colour of the marking
Bodrost – Makedonia hut	8 149.6	8.1	Blue
Makedonia hut – Predel	11 066.6	11.1	Red
Makedonia hut – Ribni ezera (Fish lakes)	1 517.9	1.5	Red
Makedonia hut – Dobro pole – Mandrata	8 793.9	8.8	Yellow
Chakalitsa – Skachkovets	4 862.0	4.9	Blue
Slavova – Chakalitsa hut	2 516.9	2.5	Red

3.2.4 Building stock

Building fund in National Park "Rila"

The data on the number, the functional purpose and the condition of the buildings in NP "Rila" are taken from its management plan for the timeframe 2015-2024 [3]. In accordance to the provisions of clause 21 of the Bulgarian Law on protected territories (LPT) the following are forbidden in the national parks:

✓construction – with the exception of mountain hostels and tourist shelters, water-supplies for the purpose of drinking, water-refining installations, buildings and facilities for the need of governing the and attending to the visitors

✓carrying out the repair of existing buildings, roads, sports- and other facilities;

In connection with these legal restrictions, as expected the number of the buildings with a different function within the limits of the park is relatively small. Furthermore, a number of omissions are being found in the information database regarding the buildings currently on hand, such as, for example:

✓the lack of documents for ownership of many of the buildings and when on hand for one of them, usually it is stated that in the said landed property there are other structures (dining-rooms, warehouses and service buildings, lavatories, transformer boxes, etc.) without documents for ownership;
✓the lack of construction's documentation on the construction sites and the installations on the park's premises;
✓the omission of the construction sites and the installations in the cadastral maps and registries;
✓the presence of a number of abandoned buildings and installations, rendering them unfit and dangerous for use;
In conclusion it can be said that the main issues regarding the buildings and the installations on the premise of NP "Rila" are connected to the insufficient and unreliable information on their ownership and utilisation, as well as the lack of constructions's documentation on their building, right to ownership and utilisation.In the management plan of 2001 an area of around 1000 ha or 1.20 % of the whole of the park's territory is presented as a "Buildings and installations" area (Infrastructural area). In this area should be place such construction sites and installations, whose purpose is to provide:
✓sleeping accommodations and recreation centres;
✓proper functioning of the park's administration and control of the tourist flow;
✓option for service of the technical installations;
✓access to certain construction sites and sustainment, repair and regular functioning;
✓option for conducting meteorological surveys, stationary inquiries, monitoring;
✓option for efficient and timely fire-precautions;
✓access of tourists and supplying tourist services in the park;
✓carrying out different types of sports with the help of the respective specialized installations;
✓providing the population with drinking water;
✓providing the population with electric power.

As a result of the carried out inventory, the number of buildings on the park's premises has been established, the detailed listing of which is presented in Table 3-36.

Table 3-36: Total number of buildings and facilities on the premises of NP "Rila".

Types of buildings and facilities	**Number**
Mountain hostels	18
Shelters and tourist dormitories	12
Lodges	16
Resort bases	36
Agricultural (shelters and sheepfolds)	24
Woodland posts	1
Transformer boxes	13
Service and subsidiary buildings	174
Dilapidated buildings	111
A castle	1
Total:	**406**

Adjacent to many of the built-up construction sites – mountain hostels, shelters, resort bases, etc., a large number of service and subsidiary buildings such as cabins, canteens, warehouse bases, lavatories, etc. has been raised up- a total of 176. Only a small part of the territory of NP "Rila" falls among the high parts of the catchment of river Blagoevgradska Bistritsa, among which the preserve "Parangalica". As is to be expected, the number of buildings here is extremely small (Table 48).

Table 3-37: Buildings and facilities on the premises of NP "Rila", falling among the catchment of river Blagoevgradska Bistritsa.

Types of buildings and facilities	Number
Mountain hostels	1
Water-suply and canalization lodges	1
Buildings for stationary surveys and monitoring	1
Agricultural (shelters and sheepfolds)	1
Total:	**4**

With regards to the ownership of the buildings in NP "Rila", there exist a number of unclear circumstances. Its own building fund is made up of 4 buildings:

✓a visitors' centre in Panichishte – a two-storey building with an expanded built-up area (EBA) of 1021 m^2.

✓visitors' house "Beli Iskar" with EBA 74 m^2.

✓visitors' house "Yakoruda"in the area of Nehtinitsa with EBA 74 m^2

✓visitors' house on the land of Belmeken with EBA 74 m^2

Up to this moment there is data on only 3 real estates on the premises of NP "Rila", which are the private property of natural or judicial persons. Other data and documents are missing as well. The real estates on the premises of NP "Rila" that are stocked as communal property should be removed from the respective books as improperly stocked or as stocked at dropped grounds and should be stocked as exclusive government property. As an end result of the stock procedure, deeds for exclusive government property ought to have been issued to all landed real estates. In view of the utilisation of only 12-15% of the capacity of the dormitory base in the park it can be concluded that the degree of the buildings' density is high enough for the accommodation of the tourists and there is no need for the erection of new mountain hostels. The construction of 3 new visitors' centres is being planned. In case there proves to be an interest in developing mountain sheep-breeding, options for reconstructing old sheep-folds should be inspected.

Building fund in the catchment of r. Blagoevgradska Bistritsa, outside the premises of National Park "Rila"

Into the catchment of r. Blagoevgradska Bistritsa fall the lands of the following settlements:

✓the city of Blagoevgrad;

✓v. Bistritsa;

✓v. Gorno Harsovo;
✓v. Delvino;
✓v. Dabrava;
✓v. Elenovo;
✓country area Bodrost

The building fund for each of the villages is characterized by the following indices:
✓number of buildings based on the type of functional purpose;
✓floorage
✓number of storeys;

The data on them is up to date for the end of 2017 and is derived from the State office for geodesy, cartography and cadaster and the Territorial statistics' bureau of the National statistics' institute in Blagoevgrad.

Building fund in the city of Blagoevgrad

The total number of buildings in the city of Blagoevgrad is a little above 15 000, with built-up area floorage of 1 677 392 m^2. The distribution of the buildings by functional purpose is presented in Table 3-38.

Table 3-38: Balance of the buildings in the city of Blagoevgrad by functional purpose.

Purpose	Number of buildings	Floorage (m^2)
Single-family residential building	1 941	139 383
Multi- family residential building	3 275	546 774
Residential building with a mixed purpose	62	20 837
Single-family country house	22	1 115
Multi-family country house	2	433
Dormitory	15	8 019
Hotel	18	6 617
Construction of the additional building-up	15	503
Other type of living quarters	713	43 612
Building for commerce	519	93 402
Building for public food-provision	123	14 093
Building for living services	47	4 524
Building for childcare services	30	13 258
Education building	74	43 884
Healthcare facility	75	14 221
Social services facility	16	4 128
Building for scientific and project facility	1	66
Building for arts and culture	43	12 563
Sports building, base	19	14 895

Administration, business building	123	38 423
Resort, tourist building	1	223
Transport building	93	20 623
Communications building	6	3 864
Cult, religious building	21	11 704
Other type of public building	73	15 681
Industrial building	669	319 804
Building for energy produce	262	19 084
Agricultural building	1 574	51 019
Building for water-supply and/or canalization	62	7 225
Building serving a special purpose	68	14 689
Warehouse base, warehouse	382	66 842
Garage, shed	4 586	105 753
Other type of industrial, warehouse, infrastructure building	52	5 012
Building with a mixed purpose	46	15 119
Total:	**15 028**	**1 677 392**

The data shows that prevalent are the residential and other buildings for living - 39,8 %. Next come the adjacent buildings such as garages and sheds – 30,5 % and the third place with a little above 10 % take the agricultural buildings. In the city the low construction prevails – almost 2/3 of the buildings are single-storey and other 1/5 – two- and three-storey. Those with a height of above 5 storeys are beneath 10% of the building fund. The distribution of the buildings in accordance to their height is presented in Fig. 3-28.

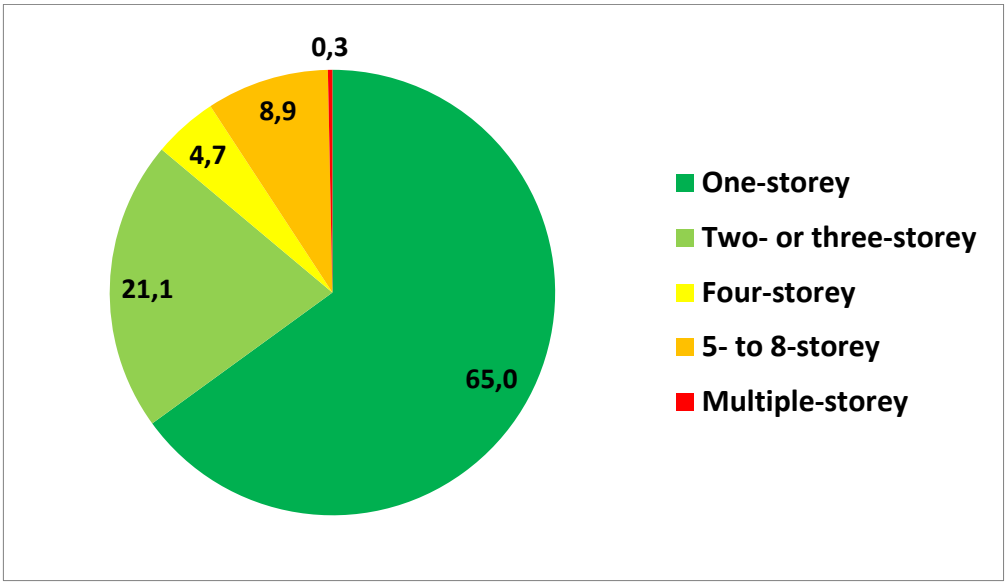


Figure 3-28: Share of the buildings in Blagoevgrad according to their number of storeys (in %).

Building fund in the village of Bistritsa

The village of Bistritsa is a scattered type of settlement with one main and a few smaller neighbourhoods. The number of buildings in it is only 71 and prevalent are the single-family country houses – 46,5 %. Second come the different types of buildings with an industrial purpose – 30,1 %. The overbuilding does not include big areas (Table 3-39).

Table 3-39: Balance of the buildings in the village of Bistritsa by functional purpose

Purpose	Number of buildings	Floorage in m^2
Single-family residential building	3	850
Single-family country house	33	1 572
Hotel	2	564
Other type of living quarters	4	75
Building for public food-provision	1	188
Resort, tourist building	2	517
Cult, religious building	3	161
Industrial building	1	222
Building for energy production	11	879
Agricultural building	7	335
Building for water-supply and/ or canalization	3	63
Garage, shed	1	16
Total:	**71**	**5 442**

In v. Bistritsa there are no buildings with a height of above three storeys. Nearly 3/4 of the constructions are single-storey and the remaining 1/4 - two- and three-storey. There are no prospects that higher buildings be erected in the village in the near future. It is very likely that a part of the existing buildings be demolished on its own.

Building fund in country housing area Bodrost

In the land belonging to v. Bistritsa, country housing area Bodrost is included as well. In it there are more than 7 times the number of the village's buildings, taking up an area that is more than 4 times larger (Tab. 3-40).

Table 3-40: Balance of the buildings in country housing area Bodrost by functional purpose

Purpose	Number of buildings	Floorage in m^2
Single-family residential building	42	3 317
Single-family country house	364	14 000
Multi-family country house	9	726
Dormitory	2	21
Hotel	6	1 083
Other type of living quarters	27	943
Building for living services	1	18

Education building	2	468
Resort, tourist building	5	1 534
Building for energy production	3	27
Agricultural building	37	493
Warehouse base, warehouse	1	12
Garage, shed	2	32
Building with a mixed purpose	1	148
Total:	**502**	**22 822**

The prevailing part of the constructions (72,5 %) are single-family country houses. They make up for more than 2/3 of the built-up area in the region. Even though the single-family country houses are only 8% of all constructions, they make up for 14,5 % of the built-up area. The relatively small number of hotels and tourist buildings (11 in all) takes the third place by area – 11,5 %. Even though there are 2 four-storey and 1 five-storey buildings, the share distribution of the constructions by height in the country area (Fig. 3-29) is practically identical to the one in v. Bistritsa.

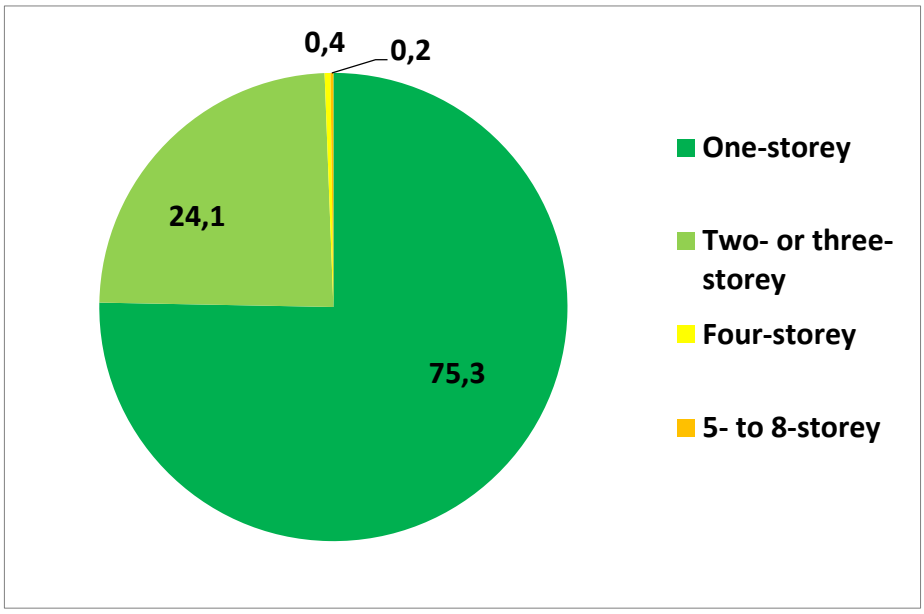


Figure 3-29: Share of the buildings in country area Bodrost according to their number of storeys (in %).

It can be expected that within the next 5-10 years some more 4- or above 5-storey buildings will be raised in the country area – mostly hotels but this will not affect the general outline of the overbuilding in the area and that of the prevalent low construction.

Building fund in v. Gorno Harsovo

The village of Gorno Harsovo is a scattered type of settlement with a few neighbourhoods and few constructions –51 in all (Table 3-41). The agricultural buildings prevail – 37,3 %, which represent 40 % of the built-up area. Next come the single-family residential buildings – 35,3 % with 27,6% of the whole built-up area in the village.

Table 3-41: Balance of the buildings in v. Gorno Harsovo by functional purpose.

Purpose	Number of buildings	Floorage in m^2
Single-family residential building	18	1 011
Single-family country house	2	98
Other type of living quarters	2	54
Building for public food-provision	1	154
Building for living services	1	23
Healthcare facility	2	717
Communications building	1	21
Agricultural building	19	1 462
Garage	5	120
Total:	**51**	**3 660**

In v. Gorno Harsovo there are no buildings with a height of above three-storeys. Around 70% of the constructions are single-storey and the remaining nearly 30% – two- and three-storey. The construction of new, higher buildings in v. Gorno Harsovo is not expected. It is highly likely that a part of the buildings be demolished on their own.

Building fund in v. Delvino

The village of Delvino is a scattered type of settlement with 2 neighbourhoods. The prevalent part of the buildings (87 %) are uninhabited, deserted and nearly dilapidated (Table 3-42). The two buildings serving a tourist purpose make up 1/3 of the whole built-up area in the village, one of them being 4-storey, with a floorage of 2184 m^2 or a little above 30% of the common built-up area.

Table 3-42: Balance of the buildings in v. Delvino by functional purpose.

Purpose	Number of buildings	Floorage in m^2
Buildings, serving as living quarters	59	3 138
Single-family residential building	4	339
Single-family country house	1	37
Other type of living quarters	2	67
Building for living services	2	152
Resort, tourist building	2	2 455
Cult, religious building	2	94
Agricultural building	36	705
Total:	**108**	**6 987**

There are no prospects for any new construction in the village whatsoever. The buildings that are demolishing on their own present a danger to the tourists in the area.

Building fund in v. Dabrava

The village of Dabrava, too, is a scattered type of settlement with two neighborhoods. The prevalent part of the buildings (86,6 %) is intended for residence but a part of them are uninhabited and dilapidated by half. This real estate makes up 2/3 of the built-up area (Table 3-43).

Table 3-43: Balance of the buildings in v. Delvino by functional purpose.

Purpose	Number of buildings	Floorage in m^2
Buildings, serving as living quarters	252	10 882
Single-family residential building	9	1 191
Building for commerce	1	12
Building for public food-provision	2	882
Building for living services	6	896
Resort, tourist building	1	678
Communications building	2	301
Building for energy production	2	63
Agricultural building	10	1 257
Warehouse base, warehouse	2	47
Garage	4	247
Total:	**291**	**16 458**

Second by floorage in square metres come the two agricultural buildings (7,6 %), followed by the single-family residential buildings (7,2 %). The only building serving a tourist purpose is four-storey, whilst nearly all buildings in the village are single-storey (Fig. 3-30).

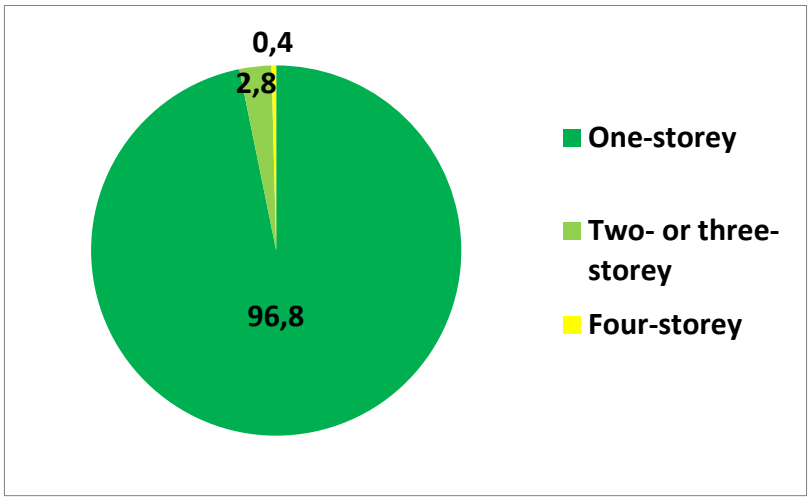


Figure 3-30: Share of the buildings in Dabrava according to their number of storeys (in %).

Building fund in v. Elenovo

The village of Elenovo has the largest building fund in comparison with the other villages examined (Table 3-44). The share of the single-family residential buildings is almost 1/3 of the number and 41,8 % of the built-up area. Next come the agricultural buildings with 31,8 % of the number and 18,2 % of the area. The warehouses take up nearly 1/5 of the common built-up area in the village. The number and the floorage of the industrial buildings are significant.

Table 3-44: Balance of the buildings in v. Elenovo by functional purpose.

Purpose	Number of buildings	Floorage in m^2
Single-family residential building	116	11 830
Single-family country house	1	34
Other type of living quarters	63	1 874
Building for commerce	2	134
Building for living services	2	310
Education building	1	128
Transport building	2	172
Cult, religious building	2	194
Industrial building	18	2 263
Building for energy production	3	144
Agricultural building	114	5 142
Warehouse base, warehouse	16	5 577
Garage	17	418
Other type of industrial, warehouse, infrastructural building	2	60
Total:	**359**	**28 281**

In the village there are no buildings higher than 3 storeys. Prevalent are the single-storey – 70,2 %, followed by the two- and three-storey (29,8 %). They, however, make up for 36 % of the whole built-up area. It can be expected that four-storey and higher buildings with an agricultural function be built in the village.

Summarised data on the building fund in the catchment of river Blagoevgradska Bistritsa

For a smoother summary of the data on the building fund, a generalisation was adopted and 7 categories for functional purpose were established. The end result is presented in Table 3-45.

Table 3-45: Balance of the buildings in the catchment of river Blagoevgradska Bistritsa by functional purpose

Purpose	Number of buildings	Floorage in m^2
Residential buildings, dormitories and other constructions for residence;	6 609	794 217
Country houses	434	18 015
Hotels, resort and tourist buildings	38	13 671
Industrial buildings	969	342 486
Agricultural buildings	1 799	59 962
Building for the publis services – commerce, healthcare, administration, education, sports, culture, arts, science, religion, etc.;	1 298	310 342
Infrastructural buildings – garages, warehouses, constructions with a special, additional or other purpose	5 261	221 763
Total:	**16 428**	**1 760 456**

The prevalent part (around 2/3) of the buildings in the catchment of r. Blagoevgradska Bistritsa are single-storey (Fig. 36). More than 1/5 are made up out of the two- and three-storey constructions. The third place by number with a nearly 1/12 part take the five-storey buildings. The buildings, higher than five-storey, are located virtually in Blagoevgrad alone.

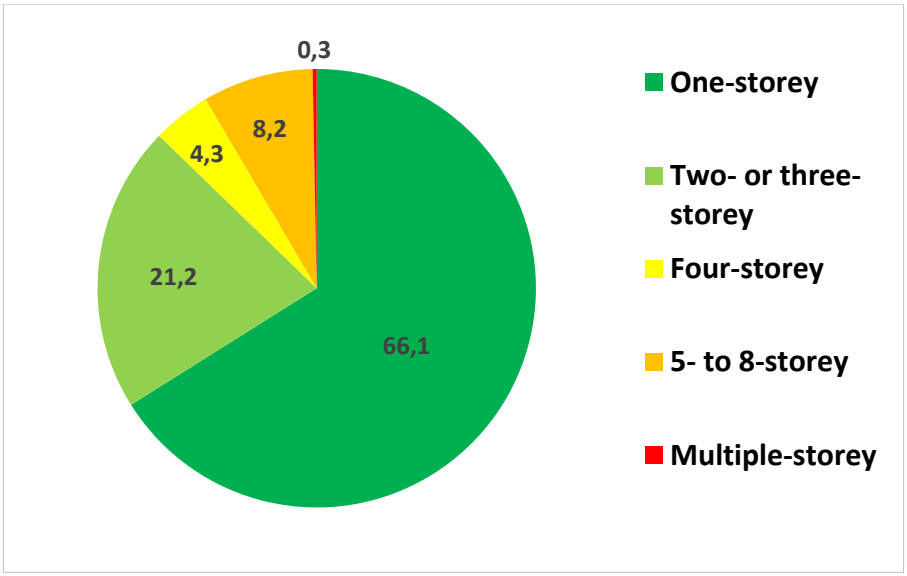


Figure 3-31: Share of the buildings in the catchment of river Blagoevgradska Bistritsa according to their number of storeys (in %).

For the most part, the 5- to 8-storey buildings are panel flat blocks with low energy efficiency. This applies to most of the public buildings in the area as well. Many of the multi-family residential buildings were refreshed in the course of the last couple of years and for others a similar renovation

is being planned [1]. This will contribute to raising their energy efficiency. In a series of cases the building fund of the construction sites for culture and education is in a precarious state. In the district's strategy for regional development of the region of Blagoevgrad 2014 – 2020 r. [2] renovation and renewing of the buildings of healthcare facilities in the villages is being envisioned, as well as reconstruction, erecting and furnishing new centres for elderly people, disabled people, raising and bringing up children, deprived of parental care, etc. Up to this moment no construction of new industrial buildings is being planned. The construction of new residential buildings is a matter of one's own initiative and cannot be trustworthily prognosticated or restricted.

All in all, the degree of acuteness of the catchment of river Blagoevgradska Bistritsa is not large. An exception is the region centre alone – the city of Blagoevgrad. An uprise in the construction in the area outside the city and a change in the general outline of building-up in the examined region is not planned and is not expected.

3.2.5 Tourist activity

The territorial scope of this report is the Rila National Park (the parts falling within the INTERREG V-A Programme Greece – Bulgaria 2014-2020) with a special focus on the catchment area of Blagoevgradska Bistritsa River which includes a small part of the protected area, some of its adjacent territories and 2 settlements – the village of Bistritsa and the largest urban center of the whole territory, the town of Blagoevgrad.

The subject of this report is tourism, therefore the accent is laid naturally on Blagoevgrad as the largest visitor flows are focused there. The report presents and analyzes the existing tourism resources and supply and the quality of offered services. It is based on literature sources such as the draft Management Plan of Rila NP and statistical information from the Municipality of Blagoevgrad but also on direct field research and personal interviews with owners and managers of tourism sites.

CATCHMENT AREA OF BLAGOEVGRADSKA BISTRITSA RIVER

3.2.5.1 Accommodation

Registered accommodation establishments

Information has been gathered on 42 accommodation estabishments from the area. Two of them have a higher category of 4 stars (Ezerets Hotel and Monte Kristo Hotel); 13 have 3 stars and the most (23) have 2 stars. There are 13 hotels, 13 family hotels, 2 motels, 2 guesthouses, 9 guestrooms and 2 huts, plus the base of the Southwest University at Bachinovo locality. The total nuber of beds is minimum 1539 of which 663 in hotels, 416 in family hotels, 60 in motels, 12 in guesthouses, 169 in guestrooms, 75 in huts and 144 in the SWU base ('minimum' means there are suits which are for minimum 2 people although they can accommodate more if needed).

Only 10% of the establishments offer actual additional tourism services; 10% more state they could offer such services is there is interest on behalf of tourists. The services are vaguely described as

'excursions' around the area, with very small exceptions. 20% of the establishments are members of the Bulgarian Hotel and Restaurant Owners Association.

Visitor flows

Information on this matter was received from 39 accommodation establishments. Over 50% of hotels state they receive guests all year round, while 15% say they have a strong summer season, and another 15% - the opposite, a strong winter season. With family hotels, 40% say they do not have a strong season; 30% quote the summer as strong, and 15% - the winter. The guesthouses and half the guestrooms also do not register seasonal difference in occupancy, while the other half of the guestroos and the motels are busier in the warm half of the year. High-mountain huts have most of their visitors in the summer; those located at lower altitude have more or less constant guest flows. Only 13% of the interviewed say their visitors come mostly during the week days; all other state week ends as stronger.

All types of accommodation are unanimous that over 60% of their guests are Bulgarians; among the foreign visitors dominate the neighbours – Greeks, Macedonians and Serbians, followed by Romanians, Turks and Russians. Then come the visitors from Western Europe such as UK, France and Italy. 'Exotic' visitors from countries such as Japan or USA are very rare. Over 70% of the visitors arrive as individual tourists; the rest of the establishments say they have both individual and organized tourists. A trend is the 'moving' of tourists from the larger to the smaller establishments and the growing number of repeat visits, that is people coming again to the place they found suitable and welcoming.

Quality of service

Informaiton has been collected for 39 accommodation establishments from Internet sources such as Booking.com, TripAdvisor and Google. TripAdvisor sadly pays little attention to the research area of Blagoevgrad; more comments can be found in Booking.com and Google. In addition, users often post just evaluation in figures, with no comments. As a whole, most user reviews are for the larger hotels; for the smaller ones there are few or missing reviews. Most comments concern location, cleanliness and quality of service. The main points of complaint regard the lack of prking spaces or lifts in higher buildings. Many of the reviews are from some years ago and they have not been taken into acconunt since the situation may have changed.

3.2.5.2 Catering services

Catering establishments

Information has been collected from 39 registered restaurants, cafeterias and night clubs in the area of Blagoevgrad, about their services and visitors. In general, those places do not offer additional services apart from live music or home deliveries. They do not have membership in any professional bodies or networks. The visitors are 80% Bulgarians, plus some guests from the neighbouring countries such Greece and Macedonia. The occupancy depends heavily on the location of the establishment. Of course, all places have higher visitor rates in the week ends but those located in

the very center of the town of Blagoevgrad are quite full during the week days too. Seasonality is related to the existence of outdoor sections and/or facilities; for example the restaurants located along Blagoevgradska Bistritsa River are 100% full during the sumer and less – in the winter. On the other hand, many establishments close for the summer as the town gets quite empty with the two universities closing for vacation and people travelling away for holidays.

Quality of service

Information was gathered about the quality of the catering service (location, food quality, sounding, Internet coverage, parking, etc.) of 37 establishments – restaurants, cafeterias and night clubs in Blagoevgrad. Information sources included field research (on-spot interviews) and Internet sources (Goolge, Facebook web pages of the establishments themselves). Apart from the good food which is more or less obvious, visitors appreciate the good service, the diversity of the menu and the nice atmosphere. What they do not like is that smoking has been renewed inside some of the places and that prices are sometimes too high for what is being offered.

3.2.5.3 Additional tourism services

Services at Rila National Park

Services at the National Park (the part falling within the focus territory) are offered mostly by the Park staff and are related primarily to educational tourism. Data has been obtained from the Park Directorate about the accomplished information and educational initiatives for the last three years (2015, 2016 and 2017). The number of outdoor lessons held has grown from 12 in 2015 to 59 in 2017, with an average of about 3000 children included in educational activities. The visits to the central office in Blagoevgrad are about 300 per year, with a slight decrease in 2017. It must be noted that the central office has only a small information corner which is not very suitable for visits, so visitor rates are much lower than in the other two visitor centers of the Park.

The area offers good conditions for hiking tourism. The NP Directorate maintains a system of hiking trails – major, secondary and specialized ones. The area in focus includes parts of 8 trails in different condition and with different level of difficulty. Four of those are entirely located with Blagoevgradska Bistritsa River basin:

-Bodrost recreational area – Makedonia Hut
-Bodrost recreational area – Kartalska Polyana locality
-Slavovo locality – Chakalitsa Hut
-Chakalitsa Hut – Mt. Skachkovets

The other four only pass through this territory:

-Makedonia Hut – Mt. Kapatnik – Predela locality (part of the E4 International Hiking Trail)
-Chakalitsa Hut – Predela locality
-Makedonia Hut – Radovichka River – Rilski Monastery
-Makedonia Hut – Mt. Arizmanitsa – Mt. Tsarev Vrah – Eleshnitsa Hut

These trails include some major ones, some secondary and one specialized. They are long, difficult, with high altitude differences and requiring quite good physical condition and equipment, not to mention good planning. It is recommended to use only the signed tracks and to obey the rules of behavior in a protected area of this caliber. The trails offer excellent opportunities to get in contact with nature and promote healthy ways of living. They pass through various landscapes with intact environment and attractive flora and fauna. There are also magnificent panoramic views and preserved ecosystems.

Services in the adjacent Park territories and the surroundings of Blagoevgrad town

In the Bodrost locality, 27 km from the town of Blagoevgrad in Rila Mountains, the Municipality of Blagoevgrad has built an interpretative and educational children's center called Eco Land. It was financed under the PHARE CBC Neighbourhood Programme Bulgaria-FYROM and is managed by the Aigidik Tourist Association. The accommodation capacity is 15 beds; there are facilities for various sports such as table tennis, rope 'garden' nd others. It is now mostly used for the organization of summer camps for children. The Aigidik Tourist Association offers other services too, incl. mountain guides for Rila Mountains. They have recently initiatied the establishment of an alpinism club.

The ski resort of Kartala has ski runs of different types with a total length of 5 km. They are suitable for both experienced and unexperienced skiers ad snow-boarders. The gondola starting at Kartala Hotel goes for 3 km up to the mountain ridge which offers grand views of RIla and Pirin Mountains.

Bachinovo Park is located at 3.5 km from Blagoevgrad. At its center lies a large pond hosting a number of decorative bird species and paddle boats, surrounded by a network of alleys for walking, cycling, jogging, etc. Picnic areas have been arranged on the green meadows, as well as play areas for children and adults. The most attractive facility is the Kokolandia rope 'garden' which has three different routes for differents ages, mini-golf playground, small climbing wall, etc. Many events are being organized at Bachinovo Park, sports as well as cultural.

Another opportunity for the citizens and guests of Blagoevgrad to interact with nature is the Krasta (Cross) Eco-trail starting from Loven Dom city park and ending at Zayuva Polyana locality where the municiplaity has erected a large cross guarding over the town and a memorial park called "Remembrance and Faith" with the Sveti Duh (Holy Spirit) Chapel. There are also information boards by the local Forestry describing the interesting plants and animals living in the vicinity.

Town services

The Loven Dom city park is located in the periphery of Blagoevgrad but it is very easily accessible from its center. It has a layered system of walking alleys among over 100 species of local and exotic plants, with occasional rest areas with a nice view towards the town below. The park has three teniis courts and a children's playground in front of the Observatory. Closeby is the city Zoo established in 1959, with an area of 150 decares and over 300 animals.

Regional Historical Museum of Blagoevgrad

In the past 3 years (2015-2017), the Museum has been visited by 57481 people (data provided by museum reports): 16827 in 2015, 20006 in 2016 and 20648 in 2017. About 50% of all visitors are children up to 12th school grade. Of the adult visitors, 95% are Bulgarians, and the biggest numbers of guests have come for special organized events at the Museum. A big success has been the traiditional Summer School for children.

There is an obvious trend of visitor flows growth which is due to the many temporary exhibitions and the varied educational programs, as well as the partnership with many schools, institutions and NGOs. The number of disabled visitors has grown which is a good sign for the services. Isolated peaks of visits are recorded in the Museum's Day of Open Doors (every Monday) and the various events which are also free of charge. The Museum offers other services too, e.g. renting of halls, inventory for films and video spots, etc.

Architectural and historical sites

The old Varosha Quarter of Blagoevgrad was erected probably around the 18th century on the left banks of Blagoevgradska Bistritsa River as the Christian district of the then Ottoman town. A central place there occupies the church of Vavedenie Bogorodichno (Vasileva & Alexiev, 2016). In the 80s of the 20th century, the Municipality of Blagoevgrad restored many of the houses and turned the place into a special cultural center hosting art galleries and workshops of artists and craftsmen; children's schools in arts, science, dance and other. The site is part of the 100 National Tourist Sites of Bulgaria. One of the houses is part of the museum complex – the home of Georgi Izmirliev, a hero from the national liberation struggles in the late 19th c. It is open for visits throughout the summer and only by booking – in the winter.

Folklore

Bulgarian folklore is being promoted in Blagoevgrad by the many dancing and singing ensembles. One of the biggest and most popular among them is the professional Pirin Ensemble established in 1954. During its long atistic career and up to now, the ensemble has held more than 7,000 concerts for over 6,000,000 visitors from Bulgaria and 60 other countries. It has numerous prizes from contests around the world.

The local Community Center (Chitalishte) of Blagoevgrad, established in 1962, has several folklore goups: Ezerets Vocal Ensemble, Djumaicheta children's folklore group, Vihren children's dance group, and the newest Pirin Dance Ensemble for young people (2016).

The Center for Personal and Artistic Development of the Children of Blagoevgrad is a cultural and educational institution targeting children between 6 and 18 years of age. Some of its schools are related to Bulgarian folklore: the children's and youth folklore ensemble of Pirinska Kitka; Pirinche dance ensemble, folklore singing school and folklore musical instruments school. The first one is the most popular; for its nearly 50 years of activity, over 5000 children have been taught Bulgarian folklore there.

Arts and crafts

Near the church at Varosha Quarter, there is a workshop of artsis who give painting lessons and sell their paintings around the old quarter. There is also a souvenir shop of Shevitsa Company offering hand-made textiles (rugs, aprons, bags, sheets, etc.), pottery, icons and paintings of local artists, hand-made copper pots, etc. In the ame house, there is a workshop for musical instruments and wood-carvings.

Cultural agenda

Blagoevgrad hosts a large number of events annually. The cultural agenda is being prepared and published by the Municipality. Among the most popular events are: Municipal Festival of Mummers' Games in the first days of January (2000 visitors in 2018), Francofolies Festival at the end of June (over 30,000 visitors in 2017), Annual Music Awards of BG Radio in the end of June (20,000 visitors in 2017), Tara-Ra-Bumbia Theatrical Festival in mid-May (17 shows in 2017), Festival of Warm Wine in mid-October (new event, still has to develop).

Blagoevgrad has a strategy to develop as a Balkan Festival Center. In 2017, the Municipality built a special events park on 62 decares, with an open stage and two multi-functional halls (Orpheus for 4,500 people and a smaller one for sports events). A special municipal company was also registered in order to manage better the cultural agenda of the town. The local government welcomes everyone who is willing to add up to that agenda.

TERRITORY OF RILA NATIONAL PARK FALLING WITHIN THE SCOPE OF THE PROGRAMME

General data on tourism on the territory of Rila NP – park sections of Blagoevgrad, Belitsa, Yakorouda and Dupnitsa

The Park Directorate reports the following visitor flows on its territory for the past 5 years:

-Year 2013: 84,249 visitors; 30,373 overnights in 10 huts and some smaller shelters with a total of 956 beds

-Year 2014: 47,517 visitors; 20,109 overnights in the same capacities as above

-Year 2015: 43,113 visitors; 21,579 overnights, same capacities

-Year 2016: 74,940 visitors; 13,152 overnights, same capacities

-Year 2017: 58,624 visitors; 16,191 overnights, same capacities

The highest number of visits are in Dupnitsa section, followed by Yakoruda, Belitsa and Blagoevgrad. Almost the same goes for the number of overnights, except that the places of Belitsa and Blagoevgrad are switched.

Accommodation establishments within the Park are mostly huts and less smaller sites not falling directly under the categorization regimes of sub-law regulations to the Tourism Act. The territory in question has 11 huts, the condition of some of which is very good while others are below base level. Despite this, all huts are used actively as the Park territory is much visited, especially in the summer.

Visitor infrastructure is concentrated in the areas of huts. The Park Directorate maintains the system of major and secondary routes. In total, there are 17 major, 43 secondary and 12 specialized trails. (Draft Management Plan of Rila National Park for 2015-2024).

Conclusions and recommendations

- Tourism as a whole is unevenly distributed around the territory, and there is a clear difference between the Park territory and the adjacent areas where settlements are located.
- The Park territory hosts only tourist huts and shelters while the hotels, guesthouses, guestrooms, etc. are located in the adjacent areas. The present numbers of beds are sufficient for the current visitor flow needs; the problem is they are unevenly distributed around the territory – e.g. there is Blagoevgrad with 1539 beds, and there is Yakorouda with only 30.
- Occupancy rates and seasonality depend very much on the location of accommodation and – correspondingly – the purpose of the visit but what prevail are short visits (mostly week-ends) by individual tourists. Bulgarians top the scale followed by the closest neighbours and then – farther European countries.
- Accommodation establishments, with very few exceptions, do not offer additional tourism services to their guests. Same goes for the tour operators and tour agents who mostly offer outgoing services to local people.
- Catering services are quite good and diverse, and more evenly distributed around the territory.
- Quality of service is hard to find for all basic services as the available sources (mostly on the Internet) show simultaneous controversial evaluations of users. This is most probably due to the different tastes and expectations of service users. Furthermore, it is not unusual that in larger establishments, different members of staff provide different quality of service, and that naturally affects the assessment by the customers.
- Additional tourism services are rare in both the Park territory and the adjacent areas; even in Blagoevgrad which is otherwise a busy center with 61979 overnights in 2017 and growing (53484 in 2015). Local tour operators only offer outgoing trips from the region. Park staff maintain a system of tourist trails and offer educational services.
- On the territory of Rila National Park, the most developed type of tourism is hiking, related to the system of marked trais and huts and concentrated in the summer months, although winter visits are registered too. Visits are disproportionate not only by seasons but by location as well. For example, visits to the Park section of Blagoevgrad (Makedonia Hut) are 100 times less than those to Dupnitsa section (huts of Rilski Ezera, Sedemte Ezera, Ivan Vazov, Otovitsa, Skakavitsa and Lovna.
- Other forms of tourism within the park are less developed around the territory falling within the Programme. There are a few national tour operators who provide hiking and/or adventurous programs.
- In Blagoevgrad, there is a great and somewhat underused potential of tourism professionals being educated at the Southwest University of Neofit Rilski and the College of Tourism. There is also a municipal Information Center that needs to be filled with contents in relation to tourism.

There is a lot that can be done to unlock the potential of the territory (both Blagoevgradska Bistritsa Catchment area and the parts of Rila NP which fall within the scope of the Program) in terms of

tourism, in favour of the natural and cultural heritage and for the benefit of local communities. Any development measures should be conformed with the Management Plan of the Park, all other strategic documents for development of the area, the relevant legislation and the interests of local stakeholders.

3.2.6 Agricultural and livestock activity

According to (Report on the activities of the Region Directorate of "Agriculture") the arable land amounts to 15 509 ha or 27 % of the utilized agricultural area (UAA). The largest share of farmland occupied for a corn-grain 38 %, technical crops are 24 %. With the largest proportion of cereal grain is wheat, which occupies 57 %. From technical cultures the largest share of tobacco-92 %, which is 14 % of the area under tobacco in the country. Potatoes occupy 3 % of UAA or 14 % of areas with potatoes in the country.

Fresh vegetables occupy 6 % of the areas with vegetables in the country, such as areas with vegetables grown under high greenhouses are 22 % of all greenhouses. Plantations in the area occupy 8.8 % of UAA, as are most major areas of vineyards-68 % of the plantations in the area. Cattle farms are 866, keeping the number 3 639 total cattle with an average size of the flocks of 4.2 cattle. Buffaloes objects are 0, sheep farms are 25 number, with total number of sheep 7 113, goats farms are 263 with 2 632 total number of goats, pig farms are 189, with 288 pigs, birds farm are 508, with 3 312 birds. All kinds of animals and birds are kept in farms of individuals, respectively, 98 % of cattle, the 99% of, sheep and goats, 92 % of pigs and 98 % of birds. Objects for horse are 58, keeping 76 number of horses. In 61 number registered Apiary growing 2 433 families as 98.5 % are in the holdings of individuals (Annual report on the situation and development of agriculture (Agrarian report 2017)). Soil map in the catchment of the Blagoevgrad Bistritsa River is presented on Fig. 3-32.

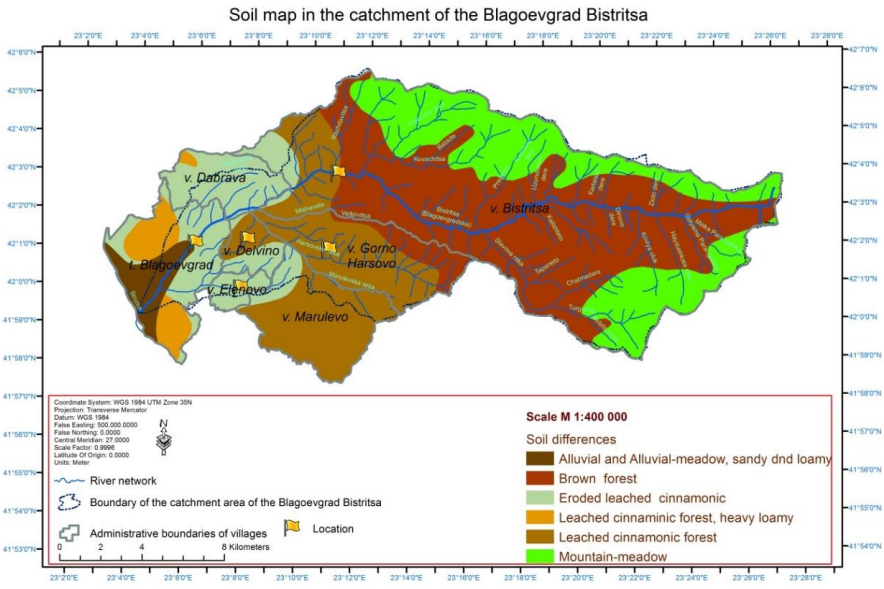


Figure 3-32: Soil map in the catchment of the Blagoevgrad Bistritsa.

The map is compiled for equal terrain and foothills by material from large-scale soil studies (predominantly M 1: 25 000), and for mountainous areas by materials from the medium-scale soil map in M 1: 200 000, supplemented by preliminary studies. For the Polish regions data from "VodProject" were used as well as published materials and other studies by: Sl. Ganchev, K. Macheva, T. Ovcharova, T. Palaveev, L. Raikov, K. Yanakiev and others (https://esdac.jrc.ec.europa.eu/images/Eudasm/BG/BG_13001_01.jpg).

The total catchment area is 27716.7863 ha. The Leached cinnamonic forest, heavy loamy soils area is 907.1020 ha or 3.27 % of total catchment area, the Alluvial and Alluvial-meadow, sandy end loamy soils occupied 809.3484 ha or 2.92 % of total catchment area. The Eroded leached cinnamonic soils area is 4000.5918 ha or 14.43 % of total catchment area, the Leached cinnamonic forest soils area is 5786.1512 ha or 20.88 % of total catchment area, the Brown forest soils area is 10498.5317 ha or 37.88 % and the Mountain-meadow soils area is 5715.0613 ha or 20.62 %.

The land cover of the in the catchment of the Blagoevgrad Bistritsa, according to Corinne – Land Cover 2012, is presented on Fig. 3-33. Detailed description of this land cover is available (http://eea.government.bg/flexviewers/corine-land-cover/).

- Water bodies are 76.344 ha, or 0.28 % of territory - (Mihaylov, 2005);
- Transitional woodland/shrub are 4675.640 ha, or 16.87 % of territory;
- Bare rock are 0.328 ha, or 0.001 % of territory;
- Natural grassland are 5032.614 ha, or 18.16 % of territory;
- Moors and heathland are 227.276 ha, or 0.82 % of territory;
- Land principally occupied by agriculture with significant areas of natural vegetation are 2915.506 ha, or 10.52 % of territory;
- Coniferous forest are 2693.305 ha, or 9.72 % of territory;
- Industrial or commercial units are 319.081 ha, or 1.15 % of territory;
- Complex cultivation patterns are 229.858 ha, or 0.83 % of territory;
- Vineyards are 192.575 ha, or 0.69 % of territory;
- Discontinuous urban fabric are 720.172 ha, or 2.60 % of territory;
- Non-irrigated arable land are 1050.522 ha, or 3.79 % of territory;
- Pastures are 1541.983 ha, or 5.56 % of territory;
- Sparsely vegetated areas are 277.665 ha, or 1.00 % of territory;
- Mixed forest are 4326.269 ha, or 15.61 % of territory;
- Broad-leaved forest are 3437.648 ha, or 12.40 % of territory;

The protected areas of NATURA 2000 are presented on Fig. 3-34 – (http://natura2000.moew.government.bg). The protected areas of NATURA 2000 are 7609.034 ha, or 27.45 % of the catchment of the Blagoevgrad Bistritsa territory.

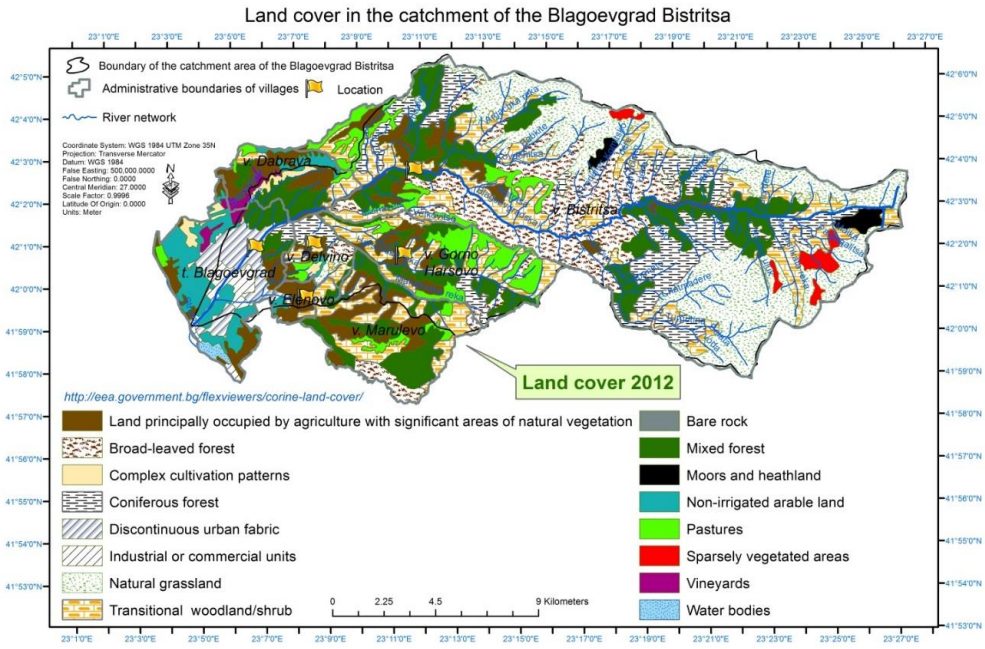


Figure 3-33: Land cover in the catchment of the Blagoevgrad Bistritsa.

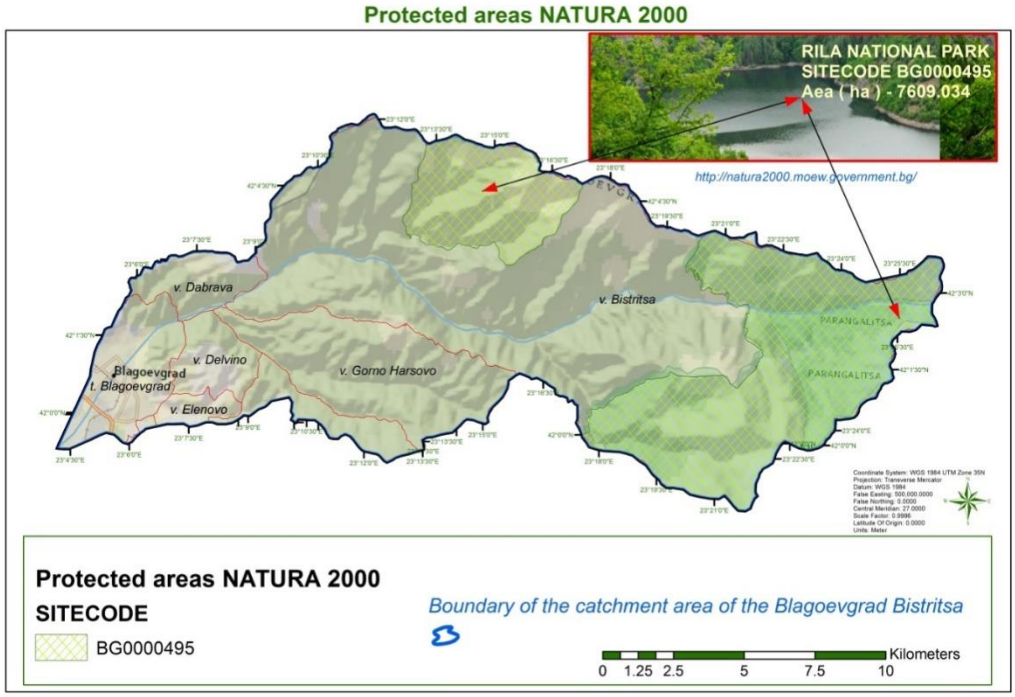


Figure 3-34: Protected areas of NATURA 2000 in the catchment of the Blagoevgrad Bistritsa

Conclusions

The protected areas of NATURA 2000 fall into RILA National Park (Rila National Park Management Plan 2015-2024) in the northern and eastern part of the catchment of the Blagoevgrad Bistritsa River. The protected areas of NATURA 2000 are 7609.034 ha, or 27.45 % of the catchment of the Blagoevgrad Bistritsa territory.

The total agricultural areas amounts to 5930.444 ha, or 21.40 % of the catchment of the Blagoevgrad Bistritsa territory and is distributed in the following way:

- Land principally occupied by agriculture with significant areas of natural vegetation are 2915.506 ha, or 10.52 % of territory;
- Complex cultivation patterns are 229.858 ha, or 0.83 % of territory;
- Non-irrigated arable land are 1050.522 ha, or 3.79 % of territory;
- Vineyards are 192.575 ha, or 0.69 % of territory;
- Pastures are 1541.983 ha, or 5.56 % of territory;

With some conditionality can be added and Industrial or commercial units, as follows:

- Industrial or commercial units are 319.081 ha, or 1.15 % of territory;

Arable land amounts to 6249.53 ha, or 22.55 % of the utilized agricultural area (UAA) of the catchment of the Blagoevgrad Bistritsa territory. The largest share of farmland occupied for a corn-grain 38 %, technical crops are 24 %. With the largest proportion of cereal grain is wheat, which occupies 57 %. From technical cultures the largest share of tobacco-92 %, which is 14 % of the area under tobacco in the country. Potatoes occupy 3 % of UAA or 14 % of areas with potatoes in the country.

3.2.7 Industrial activity

3.2.7.1 Role and Importance of Industry in Blagoevgrad Municipality

The industrial sector has an essential role in the economic development of the municipality of Blagoevgrad and the wellbeing of its inhabitants. As a regional center Blagoevgrad is also an industrial center of the region and Southwestern Bulgaria as a whole. Nevertheless, the town is heading towards deindustrialisation in the recent decades despite its favorable geographic and transport location and despite the membership of Bulgaria in the European Union since 2007. A whole series of industries that have been represented on a larger scale in the past are now minimized or completely closed. Compared to the period before 1989, thousands of jobs in the industrial branches of Blagoevgrad are closed.

Within the catchment area of the Blagoevgrad Bistritsa River, industrial capacities have been built only on the area of the town of Blagoevgrad. In the past, there was only one industrial enterprise in the area of the villages within the catchment area of Blagoevgrad Bistritsa river. It belonged to the spirits industry - Vinprom "Slavovo" - in the village of Bistritsa. At the moment it is closed and is not functioning. There are no industrial objects of interest for the present studyIn on the territory of the remaining villages: Elenovo, Delvino, Gorno Harsovo and Dabrava, as well as in the Bodrost-Kartala

resort, and in the parts of their lands falling within the Blagoevgrad Bistritza River basin. That is why we are about to focus on the industrial sites only on the territory of Blagoevgrad municipality.

The reasons for the deindustrialisation processes in recent years are complex and require a good knowledge of the political and economic situation not only in the region but also in the country as a whole. These will be analyzed in the following pages.

The reduction of industrial production, the closure of whole large enterprises or their disintegration into small private workshops had a negative impact on the sectoral structure of the municipality's economy. The resulting situation has led to unemployment among thousands of qualified and highly qualified specialists. This in turn has increased external and internal migration, mainly towards the capital of the country and to the more economically advanced countries.

Along with the negative aspects of the decline of the traditional industries in the town of Blagoevgrad, the situation can also be seen as favorable, mainly in terms of the ecology of the city.
Data in this report are taken from the official regional and national sources. The summary and analysis was done by author.

3.2.7.2 General Characterization of Industrial sector in the Blagoevgrad Bistrita river basin

In the municipality of Blagoevgrad, more than **800 companies** work in the **industrial sector**, and most of the companies are operating in the trade sector. Despite the variety of economic activities, several industrial sectors can be outlined as leading sectors in Blagoevgrad municipality: food industry, productions of beverages and tobacco processing.

Unfortunately, detailed statistics on industrial activities in Blagoevgrad at city level are not available, and even at municipality level the colected data are scarce. The National Statistical Institute presents more profound data mainly for the Blagoevgrad region and the Southwest region, which are not applicable to the needs of this report. More detailed statistics are collected on the so-called Economic center "Blagoevgrad" by the Institute for Market Economy and Regiostat. As of 2015, 97% of the production in the center is concentrated in Blagoevgrad Municipality, therefore the data from the Economic center "Blagoevgrad" can be used as a basis for the industrial assessment of Blagoevgrad municipality. The center covers three adjacent municipalities in Southwestern Bulgaria - Blagoevgrad, Kocherinovo and Simitli. It is situated on the territory of two administrative provinces as Simitli and Blagoevgrad are part of Blagoevgrad province but Kocherinovo is in the Kyustendil province. The municipality of Blagoevgrad (or the core) attracts 16% of the employees in Simitli and 29% of the employees in Kocherinovo, while the municipality of Rila is close to the transfer of the barrier of 10% daily labor migration, which would add it to the economic center.

In the Economic Center "Blagoevgrad" there's a strong concentration of the employees and the industrial production in the core - Blagoevgrad municipality. The American University in Bulgaria and the South-West University “Neofit Rilski” also have a significant impact on both the structure of

employment and wage levels. The demographic trends are not favorable. This is valid especially in the peripheral municipalities. On Table 3-46 are shown the values of some basic social and economic indices for the regional economic center (IME, 2017).

Table 3-46: Basic social and economic indices of the Economic center "Blagoevgrad", 2016 .

Economic center "Blagoevgrad"	
Average gross monthly salary (in BGN)	692
Population number	94 413
Unemployment coefficient (in %)	9.1
Share of the population in employable age (in %)	64.2

Economy and Investments

By 2015, 97% of the production center are concentrated in the municipality of Blagoevgrad, and only 2.5% in Simitli. Significant growth has been observed between 2011 and 2015 as the produced output has increased by 51%. Most of the center's economy is formed by processing industry (43%), followed by construction (21%) and transport (18%). Mining industry and education have the smallest share. In the Economic center "Blagoevgrad" there has been an increase in investments in recent years. Expenses for acquisition of tangible fixed assets have increased by 30% between 2011 and 2015. The cost of tangible fixed assets in the Blagoevgrad were BGN 1.88 billion are mainly concentrated in trade (37%) and construction: 27% .

Similar trends are also observed in foreign direct investment - there is 79% growth in the center between 2011 and 2015. In the municipality of Blagoevgrad 97% of the total EUR 74 million of foreign direct investment are concentrated, in Kocherinovo these are virtually missing,and in Simitli they are concentrated almost exclusively in the industrial sector (among the most important are in the factory for water installations). Foreign direct investment in trade (55%) and the industrial sector (28%) are dominated mainly by the emergence of modern commerce chains. Foreign direct investment in construction are decreasing significantly - to 0.4% of the total volume at the end of the period(IME, 2017).

Labor market

In the period 2011-2015 the number of employees remained almost unchanged with a slight decrease in the core and a small growth in the periphery. Almost all employees (91%) work in the core and only 7% - in Simitli. By 2015, the distribution of sectoral employment was relatively even, with a slight prevalence of processing industry (22%) and trade (14%). The sectors: "Extractive Industries" and "Real Estate Operations" are almost absent. The large share of education is impressed - it accounts for 11% of all employees in Blagoevgrad compared to 7% on average for the country (IME, 2017).

This is due to the presence of the South-West University "Neofit Rilski", the American University in Bulgaria and several colleges that are located in the town. This allows Blagoevgrad to be qualified as an educational center not only with regional but also with national and even international

significance. All residents of the town realize and admit the important role of the universities and colleges for the settlement, as they contribute for the vitality of its economy and the attraction of young people to it.

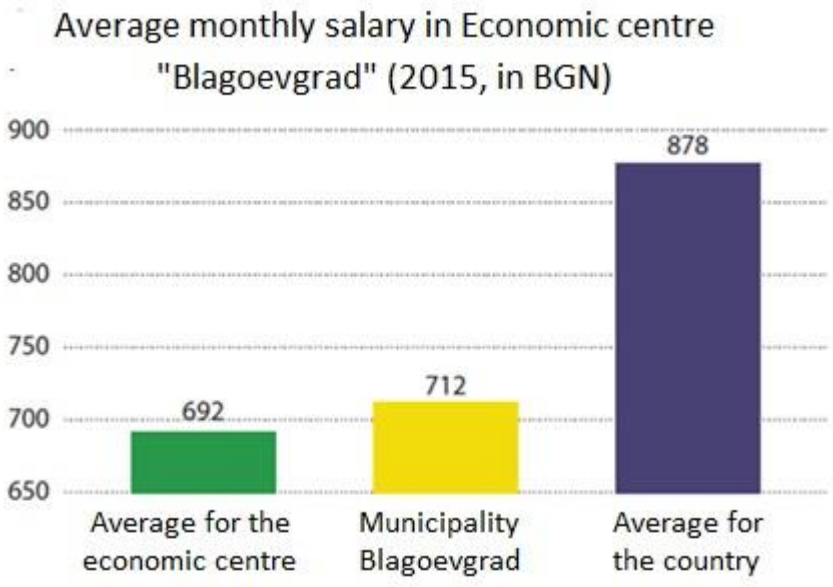


Figure 3-35: Average monthly salary in Economic center "Blagoevgrad" (2015, in BGN).

The highest growth in the number of employees during the period was observed in the transport sector (52%), while the largest decrease was recorded in real estate transactions (-54%). The latter is a consequence of bursting of the bubble in real estate since 2009, and the outflow of interest in such deals, which has led to the closure of real estate agencies or the decreasing of their staff. As shown on Fig. 3-35 the average gross monthly salary in Blagoevgrad municipality for 2015 is BGN 712. Its growth compared to 2011 is 15%, while in Blagoevgrad there is no decline in wages in any sector. The salaries also show the influence of Blagoevgrad's universities - the average pay in the educational sector (BGN 1067) is third in the municipality after energetics (BGN 1281) and agriculture - BGN 1079, (NSI, 2017). In 2016, the unemployment rate in Blagoevgrad is 7.38% as presented on Fig. 3-36. These levels remain relatively stable throughout the 2011-2016 period, with a peak in 2012-2013.

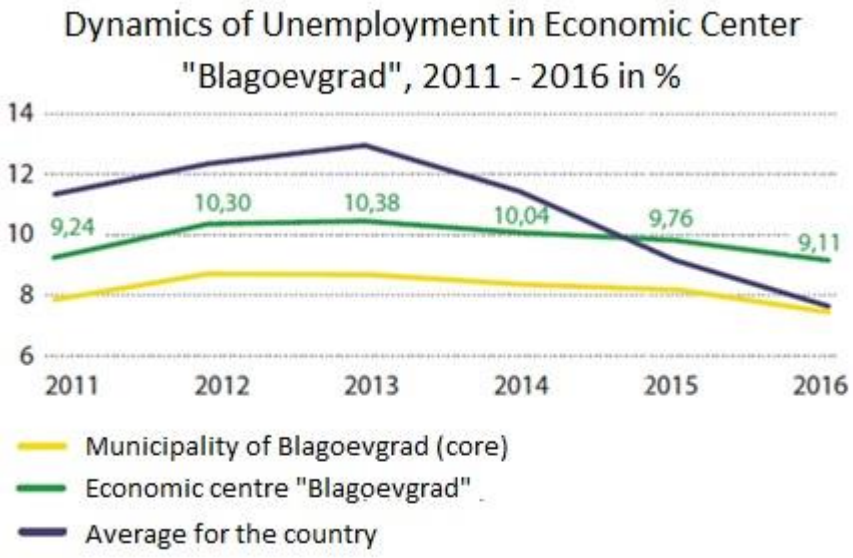


Figure 3-36: Unemployment rate changes in the Economic Center "Blagoevgrad", 2011 – 2016, in %

The trend in the periphery is a slight increase in unemployment - it increased by 1.3 percentage points between 2011 and 2015, while in the center it decreased by 0.5 percentage points.

Human resources and labour force

The economy of Blagoevgrad municipality is relatively diverse and well balanced. The main sectors, which have the largest contribution to the production volume and production the number of jobs created are industry, trade and transport. According to data from the Registry Agency (BULSTAT register), legally registered and actively operating companies in the Municipality of Blagoevgrad are currently 5 322. Over 90% of them are micro-enterprises employing up to 10 people, nearly 5% have staff between 11 and 50 people and around 2% have more than 50 employees. The medium-sized enterprises in Blagoevgrad Municipality are 137. The spheres of economic activity of the Blagoevgrad municipalities are diverse. In almost every category of economic activity there is at least one active company on the territory of the municipality (NSI, 2017).

The distribution of the companies in Blagoevgrad municipality by type of economic activity is presented at Table 3-47 as listed in the (Struma Business catalogue, 2018)

Table 3-47: Number of economic enterprises in Blagoevgrad municipality by types of economic activities.

Area of economic activity	Economically active companies
Forestry and agriculture	65
Extractive industry	6
Healthcare	223
Education	40
Industrial production	467

Construction, Properties	446
Transport, Communications, Automobiles	670
Trade	1974
Services for the population	438
Financial and business services	615
Hotels and restaurants	378
Total	5 322

Population in working age is 64.2% of the total, or 60 500 people in 2016. The share of working population does not change significantly between 2000 and today and reaches its peak of 69% in 2008 (NSI, 2017). The level of unemployment in municipality of Blagoevgrad for 2017 is 7.4%. It increases by 1.2% in comparison with the previous year - 2016, when it used to be 6.2% (NSI, 2017).

3.2.7.3. Characterization of Industrial sector in the Blagoevgrad Bistrita river basin by economic branches.

Energetics

This economic sector is very well developed in the municipality. It specializes in the development and export of innovative technologies in construction of power plants for utilization of renewable energy sources at European and world level. This is due to the presence of one specific company on the territory of Blagoevgrad - Hydroenergy Company JSC.

Hydroenergy Company JSC (HEC) is the Blagoevgrad company, which “covers the world” with photovoltaics. It deals with the construction of photovoltaic parks and is probably the most important player in this sector for Bulgaria in general. It is still not very well known in our country. And there's a reason - her successful business is mostly in distant and often exotic-looking destinations like Chile. HEC can boast as a subcontractor for projects in many other parts of the world such as the United States, Jordan, Japan and, of course, Europe. In the future, the company plans to build parks in Mexico, Nigeria and Abu Dhabi. So far 1 528 MW of photovoltaic capacity installed worldwide are made namely by this Blagoevgrad company, and another 232 MW are currently under construction (“Capital”, 2017).

The company was established in 2007 with a capital of BGN 5,000 and an asset of nearly BGN 1 million according to its first financial report. In 2014, the company was transformed into a joint stock company with a capital of BGN 4 mln. The "Hydroenergy company" operates on four continents and its employees are over 600 in 10 offices around the world.

After 2013-2014, the company's interest began to expand beyond Europe, where photovoltaic energy projects are in growing numbers and their scale is many times bigger. One reason for this is that this technology becomes more and more efficient, which leads to a drop in the equipment prices. The company's first bigger project in Chile was built in 2014 with a capacity of 147 MW as the main subcontractor of the American company “Sunedison”. According to HEC's main shareholder

Ivan Chapov, this was the largest project of this kind made in South America until that moment ("Capital", 2017).

The biggest project, built by the company, is in the US, in Georgia, with a total capacity of 320 MW. The company also has projects in Jordan and Japan. It is now applying for projects in Mexico and Nigeria. The company is also interested in building photovoltaic parks in the Middle East, and is currently applying for a very large project in Abu Dhabi.

Regarding the workers - the company initially only hires Bulgarians, but subsequently starts taking local or neighboring countries. The elite specialists, whom the company calls the "core", are however only from Bulgaria.

According to the company, it is difficult to find employees with the necessary qualifications, and depending on the projects they have hired up to 1 050 people. The advantage of HEC, which provides it with so many projects in different parts of the world is that it works on a turnkey basis. It is specialized in performing all construction and assembly works, ranging from excavation, roads and fences to the installation, electrical and video surveillance. "Companies that offer all of these activities are very few in the world, and investors are looking for exactly such kind of builders as us, because with fewer participants the project is easier," says Chapov. In his words, the company's experience ranks it among the top 10 companies in the world in this branch. In the future, plans include the company to become public, although a particular stock exchange isn't considered yet ("Capital", 2017).

Table 3-48: Installed capacity and electricity generation from renewable energy sources in the municipality of Blagoevgrad, 2012

Municipality of Blagoevgrad	**Renewable-energy** power plants (in numbers)				Installed capacity	Produced energy
	Wind	Hydro	Solar	Total	MW	MWh
	0	2	1	3	2.371	66.48

The municipality of Blagoevgrad is not well represented in terms of installed capacity and produced electricity from renewable sources. As shown in Table 3, these quantities are still very limited (Agency for Sustainable Energy Development, 2012).

State Enterprise for energy supply "**Energosnabdyavane**" – Blagoevgrad.
It is a successor of the Electricity Service in the Municipality of Gorna Dzhumaya (Blagoevgrad), established in 1928. Its successor in 1992 became the "NEC" JSC - branch "Energosnabdyavane" – Blagoevgrad, for transmission, distribution of electricity; the purchase of electricity from other domestic producers; construction, repair and investment. It is subordinated to the State Agency for Energy and Energy Resources. In 2000 it was transformed into Ltd, branch of "Electricity Distribution - Sofia District". It was privatized in 2005. The owner of 67% of the company's capital since **2005** is the Czech company **CEZ GROUP**.

The **Industrial enterprise** "**Promishlena energetika**" (Industrial Energetics) **– Blagoevgrad** was active between 1980 and 1998 (AARB, 2011). It was created by Council of Ministers Decree No 23 of 18 May 1979. From the 6 of Jan. 1990 is transformed into State company "Thermopromenergo". It carries out production, trade and engineering activities in the country and abroad in the field of industrial and communal energy, chemical washes of industrial and domestic boilers and production of spare parts for them. It was sold in 1997 to "Promishlena energetika" Ltd. - Blagoevgrad.

Machine building and metal processing industry

In the field of **machine building and electronics** the main products produced on the territory of the municipality are: telephone exchanges, refrigerators, printed circuit boards, speakers and measuring instruments.

The most important enterprises are the **Plant for Measuring Instruments and Appliances "Standart "**, which exports a large share of its production, the **Plant for communication equipment**, which works predominantly for the Russian market, the **Plant for printed circuit boards** (PCB's), **Plant for loudspeakers**. The branch is fully restructured and manufactures export goods, mainly for the countries of the European Union, the Middle East and the Balkans. Smaller companies that produce separate components are actively acting as subcontractors for large enterprises (DPBM, 2014-2020).

Plant for mechanical constructions – Blagoevgrad

It was created by Order No. 78 of 24 February 1970 of the Committee for Economic Coordination (AARB, 2011). The plant is part of the State Economic Association "Computing and Organizational Equipment". Its main activity is the manufacture of household appliances, mechanical constructions and since 1990 also of refrigeration products. From 1989 to 1991 it had been an Electronics and Mechanics Plant. By Order No. 19 of 17 September 1991 of the Council of Ministers it was transformed into "Inkoms - Electronics and Mechanics" Ltd. - Blagoevgrad. It was privatized in 1996.

Factory for Measuring Instruments and Appliances - Blagoevgrad, 1965-1996

It was created in 1965 with Decision No. 448 of the Council of Industry and Construction at the Council of Ministers (AARB, 2011). The factory is to State Economic Association "Factory for metal cutting machines" - Sofia with subject of activity - production of mechanical measuring instruments. It was registered in 1991 as Plant for Metal Processing Machines - Ltd. - Blagoevgrad. The company designs, manufactures and implements metal cutting, woodworking machines and measuring instruments and equipment, household goods, services and trade. In 1996 it was transformed into Plant for Measuring Instruments and Appliances "Standart " Ltd – Blagoevgrad

Sole Trading Company "Incoms" - Tooling Equipment and Non-Standard Technological Equipment - Blagoevgrad, 1980–2001

It was created by Order No. 1875 of 6 December 1979 of the Ministry of Electronics and Electrical Engineering, as Plant for Tooling Equipment and Non-Standard Technological Equipment (AARB, 2011). In 1991 it was transformed Sole Trading Company "Incoms" - Tooling Equipment and Non-Standard Technological Equipment - Blagoevgrad. The subject of activity is development, production, service and repair of tooling equipment and non-standard technological equipment for

communication equipment; goods and services for the population. Since 1999 becomes a Ltd. Privatized in 2001.

Sole Proprietorship Limited Company "Metalkofrazh" (Metal formwork) **- Blagoevgrad** 1985-2000
It has existed since 1 January 1986 on the basis of Order No.RD-14-02-1238 of 18 December 1985, by the Ministry of Construction and Urban Development (AARB, 2011). The factory for formwork forms, mechanized tools and spare parts is a division of Scientific-Manufacturing Plant "Formwork Equipment" - Plovdiv. The successor of the plant was the State company "Metalkofrazh" established in 1991. The company is engaged in manufacturing and trading of formwork equipment, building materials and metal constructions, equipments and tools. It was transformed in 1992 into Ltd. Owner of the company since 2000 is “Moststroy” JSC – Sofia

Electrical and electronic industry
Combined-plant for Communications Equipment "Georgi Dimitrov" – Blagoevgrad, 1976–2000
It was created by Order No. 152 of 11 August 1976 of the Council of Ministers as a telephone plant for telephone equipment (AARB, 2011). It belongs to the department of the State Economic Association "Resprom”, according to Order No. 90-33 of August 31, 1982 the Ministry of Machine Building and Electronics it is merged with the Plant for Communication Equipment - Blagoevgrad. As of January 1, 1987 it becomes "Technological Combined-plant for communication equipment Georgi Dimitrov", in the structure of "Information and Communication Systems" (“Inkoms”) - Sofia. In its best years the plant used to employ more than 3 000 workers. In 2000 he was **privatized** by the Workers Managerial Company, his **assets were sold out** and the plant was **closed**. At the moment, some of its production halls are being rented to tailoring companies.

Plant for loudspeakers “Grozdan Nikolov”- Blagoevgrad
It is established according to Decree of the Council of Ministers No 116 of May 5, 1960, on the development of low-voltage electric power industry (AARB, 2011). The scope of activity is research, implementation and production of loudspeakers, speakers and systems, provision of household goods, trade in the country and abroad. In 1997 it was transformed into JSC "Loudspeakers" – Blagoevgrad. The plant is among the few that survived the wave of bankrupts caused by unsuccessful and thief-privatization. At the present moment it works at a good scale and continues to sell and export its production within the country and abroad.

Plant for building elements (“Zavod za gradivni elementi”) **- Blagoevgrad**, 1967–2000
It was established by Decree of the Council of Ministers No. 31 of 4 August 1968 as a plant for the production of building elements for automatic telephone exchanges (AARB, 2011). Since 1982 is a plant for communications equipment at the Combined-plant for Communications Equipment "Georgi Dimitrov". In 1990, he was a private plant, which since 1991 has been a shareholder in JSC "Incoms-telecom Holding" - Sofia. The additional scope of activity is the production of plastic products, electronic assemblies and details. It was sold in 2000 to Communications Engineering JSC - Blagoevgrad.

Plant for printed circuit boards „Electron“ - Blagoevgrad

Created on the basis of Decision No. 30 of 12 December 1981 of the Council of Ministers and Order Number: RD-09-1652 of 21 December 1981 of the Ministry of Mechanical Engineering and Electronics (AARB, 2011). Its successor was the "Plant for printed circuit boards " - Blagoevgrad, registered in 1991. It has the following scope of activities: production of printed circuit boards, marketing and information activities, trade representation and mediation activities, intellectual property transactions. Privatized in 1999.

Chemical industry

This industrial branch is not covered in Blagoevgrad Municipality. There were some small workshops for plastic components within the big combined-plants for communication equipment, but not any traditional factories of the chemical industry. This is good from an ecological point of view because the branch is among the greatest pollutants of natural environment. The preservation of clean local environment allowed for the development of the tourism and innovation and educational activities on a later stage.

Construction

In the years before the global financial crisis, there has been an increase in the construction sector and the real estate market. There are about 20 major construction companies in the municipality with serious market positions. According to the Municipal Development Plan of Blagoevgrad Municipality 2007 - 2013, some of them have 300-400 permanent workers. In the period of the economic crisis of 2009 and after, the turnover of the companies in the sector fell (DPBM, 2014-2020).

Production and extraction of building materials

State Economic Association "Stone Industry and Building Products" - Production Branch "Construction Products" – Blagoevgrad

It was created by Order No. 480 of 29 June 1963 of the Council of Ministers (AARB, 2011). It comprises the cement-based polygons in the county as a Building Industry Enterprise. By decision No 5202 of Blagoevgrad District Court from 1 oct. 1991 was registered as **"Yugostroy" Ltd**. The object of activity is design, construction, production of cement products, details and constructions, waterproofing and trade. It was privatized in 1999 by “Yugostroy” Ltd. - Blagoevgrad.

Timber industry, wood processing and furniture industry

Firms engaged in logging and wood-harvesting, work mainly for export (mostly for Greece and Macedonia). Wood and furniture enterprises have almost equal share in the local industry. Two of them are large, with about 300 workers. These companies provide work as subcontractors for the smaller ones in this sector.

State industrial enterprise "Dimo Hadzhidimov " – Blagoevgrad

It was set up on 23 December 1947 and was the successor of the nationalized lumbermill factories and furniture companies in the region (AARB, 2011). The object of activity is the production of

scraped wood materials, plywood, layered wood,packaging and furniture, trade in the country and abroad. In 1991 it was transformed into Ltd. After that it was sold during the period 1996-2001.

Specialized wood processing factory "Arso Poptodorov" - Blagoevgrad

It was created by Decision No. 75 of 4 December 1963 of the District People's Council – Blagoevgrad (AARB, 2011). It is a successor of the many small wood processing workshops in the town. Since 1989 it has been a division of state-owned company "Comfort" - Sofia. Based on Order No.RD-585 of 5 August. 1991 of the Ministry of Industry, Trade and Services the company was transformed into **"Mebelfab" JSC**. Its scope of activity is production of furniture, wood products and trade in the country and abroad. It was announced for sale in 1996.

Textile and sewing industry

Textiles and clothing

The **textile and clothing industry** is **among the main and best developed** industrial sectors in Blagoevgrad Municipality. There are small, medium-sized and large companies, that work in this sector.

Leading companies, which are **big companies** within the meaning of the Law on Small and Medium-Sized Enterprises are: **"Strumateks" JSC**, **"Struma style" Ltd**, **"Prima" Ltd**, **Labor-Productive Cooperatives "TPK Rila" and "TPK Nov sviat".** The ownership of a significant number of enterprises is foreign, mainly Greek. They produce cotton yarns and fabrics, workwear and uniforms, ladies' and men's apparel, knitwear (DPBM, 2014-2020).

Medium-sized companies in the sector are: **"Valentina-Strumyana" JSC, "Milena" JSC, "Ledian" Ltd (which works mainly for the French market), "Vamos" Ltd, "Vyor-Antonov" Ltd, "Asparuh 91" Ltd**, and others. Their activity is mainly focused on the production of textile garments (DPBM, 2014-2020).

Small companies (10-50 staff) and **micro-companies** (with staff below 10) are numerous and sew textiles and knitwear. A potential market niche for them is the production of single (boutique) clothes for export to the European market. Recently, there has been a decrease in the share of output, worked on tolling and an increase in outsourcing transactions where the pay is better. Most of the textile companies have their own shops on the territory of Blagoevgrad Municipality, where they offer a finished product. The foreign customers of the tailoring companies in the municipality are from France, Germany, Italy, while the finished products are mainly directed towards Greece (DPBM, 2014-2020).

State industrial enterprise - Cotton-weaving factory "Gotse Delchev" – Blagoevgrad

It is the successor of the nationalized joint-stock weaving factory for production of the item "American" (AARB, 2011). Its activity began in 1948, and in 1949 additional weaving looms were delivered. By decision No. 35 of 1989 of the Council of Ministers, the Textile Fabrication Company becomes part of the state-owned company "**Pamukoteks" - Sofia**. Following the termination of its

activity on the basis of Order No. RD-17-111 of June 28, 1991, of the Ministry of Trade and Services, was established the state firm **"Strumateks"- Blagoevgrad**. The scope of activity is the production and trading of cotton fabrics and fabrics-mixtures of cotton fibers intended for sewing of work and sportswear for the domestic market and for export. Since 1991 the company becomes a JSC. On November 20, 1998 it was sold to **"Strumateksinvest" JSC - Blagoevgrad**.

Footwear industry

State Footwear Company "Vihren" – Blagoevgrad

It was created by Order No. I-584 of 13 September 1982 of the Ministry of Light Industry as a "Vihren" Footwear Factory, part of the State Economic Association **"DSO Mladost"** (AARB, 2011). It was transformed in 1991 into state-owned company "Vihren - Bl" with scope of activity: manufacturing and trade of shoes for sport and everyday life. Since 1992 is registered as Ltd, and in 1996 is registered as JSC. Sold in 1997.

Polygraphic industry

District polygraphic company "Nikola Kalapchiev" – Blagoevgrad, 1951–2005

It continues the economic activity of the printing factory of Stefan Nikolov, established in 1915.. Since October 1, 1951 it has been **nationalized** (AARB, 2011). Its main activity is the printing of the **"Pirinsko delo" newspaper**. Its successor is the State Company **"Pirin Print"**, registered on October 22, 1990 ". The subject of activity is the printing of periodicals - newspapers and bulletins, incidental production, layout and printing of technical documentation and advertising materials, trading of printed products. On October 16, 1992 it was transformed into **"Pirin Print" Ltd**. In 1998 he was declared liquidated. By Decision No 94 of 12 Jan. 2005 of the Blagoevgrad District Court, the company is **deleted** from the Commercial Register.

Food industry

Brewing industry

State brewery "Pirinsko pivo" – Blagoevgrad

It was established by Decision No. 131 of 30 March 1967 of the Council of Ministers as a State Enterprise for bottling and trade in beer at DSO "Balgarsko Pivo" (AARB, 2011). Since 1997 it has been transformed into "Pirinsko pivo" JSC.

This is a rare example of **successful privatization**. It happened due to the involvement of a strategic investor, who has the financial funds and experience to develop and modernize the factory.

Carlsberg Bulgaria JSC (the owner of the **"Pirinsko"** brand) is the other major structuring company in the food and beverage industry. The production capacities of the "Pirinsko Pivo" plant, founded in 1967, are now part of the Carlsberg Group. Pirinsko pivo was acquired by the Danish company in 2003 and today it is emerging as the fastest growing company in the brewing industry, which ranks second in market share in beers. In 2006, modernization investments amounting to **BGN 20 million** were made at the plant. Approximately **300** people are employed in the production (DPBM, 2014-2020).

The product portfolio of the company includes a variety of **first-class** beers - the national **Shumensko** and **Pirinsko**, the international brands **Carlsberg** and **Tuborg**, the Czech **Budweiser Budvar**, the German **Erdinger** wheat beer and the Belgian Kramer **Grimbergen** beer. Carlsberg Bulgaria also offers the cider Somersby in five varieties - apple, pear, blackberries, blueberries and cloudy cider with Somersby Apple Blend. Carlsberg Bulgaria employs nearly 500 employees, including all employees of the breweries in Shumen and Blagoevgrad, as well as the administrative team of the Sofia office, the commercial force and the logistics centers all over the country.

Production and processing of meat

The main enterprise in the industry is **"Karol Fernandez Meat" Ltd.** (KFM Ltd.), which employs nearly 130 workers and has realized investment in production for EUR 1 million (provided by the SAPARD program). Smaller companies in the sector are **"Interxim" Ltd** and **"Difil" Ltd**.

KFM - Karol Fernandez Meat Ltd (The former meat factory "Mesocombinat Blagoevgrad") holds a FSO marketing license in the EU. After full monitoring of good manufacturing practices, the System for Identifying and Critical Control Points (NASSR) and traceability system, representatives of the Food Safety Organization (FSO) of the European Commission designate the enterprise as an operator covering all Euro-standards for quality, hygiene and safety of raw materials, intermediate and finished products (DPBM, 2014-2020).

Processing and canning of fruits and vegetables

The sector is presented by the company: Sole Trader "Katlin Hristova"

Non-alcoholic beverages and mineral water

The sector is presented by the factory for bottling of drinks and mineral water **„Eco-bottles"Ltd**. Another company from Blagoevgrad produces the bottled mineral water **"Rilana"**, but the productive capacities are established in the adjacent municipality of Kocherinovo, which is located outside of the Blagoevgrad Bistritsa river catchment area

Factory for soft drinks – Blagoevgrad, 1972–2000

It was created by Council of Ministers Decree No. 29 of 27 September 1972 by merging of the non-alcoholic beverages workshops at the "Bulgarian Pivo" State Economic Association in Blagoevgrad, Gotse Delchev and Petrich (AARB, 2011). Since 1983 the factory has been transformed into a plant. According to Decision No 11/18 of 29 November. 1988 of the Economic Commission of the Central Cooperative Council the workshops in Gotse Delchev and Petrich are separated from it. Successor of the Plant is the established Labor-Productive Cooperative **"Vodoley 90"**. Labor-Productive Cooperative "Vodoley 90" JSC is **deleted** from the cooperative register on 29 March 2000.

Wine and spirits

Several wineries are operating in the municipality of Blagoevgrad, including **"Vinprom Logodazh", "Vini Bozhkilov", "Vinprom Gorna Dzhumaya" Ltd, "Vinprom Taskov Distillers and Wine –**

Wintasproject" Ltd, "Vinex Commerce" Ltd., most of which are also for exporting their production abroad.

State enterprise "Mlekoprerabotvane" ("Milk processing") **– Blagoevgrad,** 1958–1997
It was created on the basis of Council of Ministers Decree No. 35 of 17 February, 1959, whereby the purchase and processing of milk passes from the co-operative sector to the State-owned enterprise "Milk processing" (AARB, 2011). Since 1977 is an economic enterprise **"Mlechna promishlenost"** ("Milk industry"). The main subject of activity is added trade in dairy products in the country and abroad. In 1992 it was transformed into Ltd, and since 1996 it has been JSC. Privatized in the beginning of 1997.

Urban industrial enterprise "Hlebna promishlenost" ("Bread Industry") **- Blagoevgrad, 1955-1993**
The enterprise has existed since 1955 (AARB, 2011). His successor since 1989 is the Municipal Company **"Hleboproizvodstvo I sladkarstvo"**("Bakery and confectionery"). The subject of activity is production and trading of bread, snacks, confectionery and boza (popular fermented beverage in Bulgaria). In 1992 it was transformed into **"Hlyab I hlebni izdeliya" Ltd** ("Bread and Bakery Products" Ltd) - Blagoevgrad with additional scope of activity production of soft drinks and transport. At the present stage the company is closed, its area is transferred to Carlsberg Bulgaria.

Tobacco industry
The main enterprise in this branch is **"Blagoevgrad-BT" JSC**, which is the **biggest** and the most modern tobacco factory in Bulgaria. The factory employs about **2000 workers** and is one of the largest employers in the municipality (DPBM, 2014-2020).

The company produces nearly **half** of the cigarettes destined for the Bulgarian market. After the modernization of the plant in 1994, its capacity reaches **13-14 billion cigarettes** per year. An interesting occasion for analysis is the fact that the plant "Blagoevgrad" BT has been one of the most undesirable places to work before 1990 due to unhealthy conditions there. After its privatization, however, its salary improves to the extent that employees receive salaries above the average for the municipality and are equalized by pay with the enterprises from the machine building and electronics sectors. This made the company an extremely desirable place to start work in.

It was created in accordance with the Tobacco Monopoly Act of 1947 (AARB, 2011). It emerges as state enterprise **"Tyutyuneva promishlenost"** ("Tobacco Industry") – Blagoevgrad. It is the successor of the nationalized tobacco cooperatives in the region. It continues the activity of buyout, industrial processing of tobacco and trade with them, such as the divisions of the Bulgarian State Tobacco Monopoly, the State Tobacco Association **"Balgarski tyutyuni"** ("Bulgarian tobaccos") and the **"Bulgartabak"** Economic Association. Apart from the traditional activity **"Blagoevgrad-BT" JSC** carries out production, preparation and trade with tobacco products. Privatized in 2011, its **future remains uncertain**.

Enterprises of the local industry

Economic Directorate "Local Industry and Domestic Services" – Blagoevgrad, 1969-1996

It was established by Decree - Law No. 16 of July 3, 1970, to govern the local industry in the county (AARB, 2011). The successor of the Directorate is the State Enterprise **"Mestprominzhenering"**. It's subject of activity was: development, design, commercial, training and retraining of personnel. It was transformed into "Promtransfer" in 1989. Closed in 1996.

Economic Directorate "Local Industry and Domestic Services" - branch "Mir" - Blagoevgrad, 1969-1999

It was established in 1969 by a decision of the Blagoevgrad District People's Council (AARB, 2011). Performs casting of ferrous and non ferrous castings, welding steel structures, production of rubber products, electrometer boards and industrial oxygen, forging services and others. Since 1988 belongs to commercial association **"Metalsnab"**. Its object of activity is the sale, supply, production and trade of metals and metal products, industrial-repair and engineering services. Privatized in 1999.

Economic Directorate "Local Industry and Domestic Services" - branch "Bratya Dermendzhievi" - Blagoevgrad

It was established by Decree No. 31 of July 26, 1971, (AARB, 2011), on the basis of the unification of workshops by Arso Poptodorov Industrial Combined-Work and the "TPK Nikola Vaptsarov"(Labor and Consumer Cooperative "Nikola Vaptsarov"). From 15 September 1989 he was transformed into the Municipal company **"Narodna mebel"** ("Citizen's furniture"). The subject of activity is the production of upholstered furniture and other small wooden products, customized services, furnishing of buildings of the capital construction and public organizations. It was sold in 2002 to "Alagon Car" Ltd. - Sofia.

Labor and Consumer Cooperative „Edinstvo" ("Unity") **– Blagoevgrad**

It was established on January 17, 1947, (AARB, 2011), as Shoe producer cooperatives "Unity". Since 1960, after the accession of the Shaving cooperative "Macedonia" and Malina confectionery cooperative, it was transformed into a labor-productive cooperative "Yuli Dermendzhiev". The company has the following workshops for goods and services: "Handbags", "Special bags," "suitcases", "Folders", "Bags - services", "Leather clothing", "Shoes - order", "Shoes - repair", "Saddlers", "Home Appliances" and "Ski repair". Its successor on 20 July 1989 was the municipal company **"Bodrost"**, which in 1992 was transformed into Ltd. Since 1991 it has been sewing leather products for the Belgian company "**Samsonite**". It was put up for sale in 1993. It was sold in 1998.

Conclusions

At present, Blagoevgrad is in a transition period from a classic industrial center with local and regional importance to a modern economic center of innovative and educational initiatives. At this stage a number of classical industrial branches in the city are in decline and suffer a greatly reduced number of employees, or completely closed. Research centers established and funded under the initiative of South-West University "Neofit Rilski" and the American University in Bulgaria are operating in the city. In Blagoevgrad secondary schools, colleges and universities are educated

thousands of future qualified personnel for the needs of the region, the country and the rest of the world. Their practical training is at a very high level, with graduates acquiring degrees from: "specialist", „professional bachelor", "bachelor", "master" and "doctor". The good language training of the manpower forces allows their realization abroad.

As a result of these processes, Blagoevgrad will increasingly become the center of scientific, research and development activities. Its strategic geographic location will continue to have a strong impact on the structure of the local economy, maintaining the role of the city as a logistic and transport center of Southwestern Bulgaria and a starting point for doing business in the neighboring Republic of Macedonia and the Republic of Greece.

The insufficient provision of agricultural land, the constantly increasing environmental standards and the contemporary realities of the economic scene will further exacerbate the crisis in the traditional industrial sectors in Blagoevgrad. Gradually it will transform from a typical center of traditional industry for the region into a center of science, innovation, services and environment-friendly productions. The presence of specialists in the application and implementation of projects funded by the EU will facilitate the attraction of investments for modern economic initiatives. An increasingly important role will be played by the business start-ups for innovative productions.

3.2.8 Other impacts from anthropogenic activities

Air pollution is one of the main environmental reasons for a series of diseases in Europe. The effects of the poor quality of air are most badly experienced in the urban areas where people encounter significant health problems and by the ecosystem where vegetation is damaged. The economic activities related to road traffic, the generation of electrical and heat energy, the industry and agriculture are the main sources of air pollution. The fine particulate matter (PM_{10}), ozone (O_3), benzo(a)pyrene (indicating the presence of polycyclic aromatic hydrocarbons) and nitrogen dioxide (NO_2) are the main pollutants causing the most serious problems with regard to the ambient air quality and human health .

Description of the district for AAQ assessment

In compliance with the requirements of the national and European legislation the territory of the country is divided into six areas and agglomerations (with a population exceeding 250,000) for ambient air quality assessment and management (DAAQAM) and they are rated depending on the degree of pollution. With Order No. RD-969/21.12.2013 of the Minister of Environment and Water establishing the districts for AAQ assessment and management and the areas in which the permissible deviation limits have been exceeded, the Municipality of Blagoevgrad is included in the "Southwest" district for AAQ assessment and management with code BG0005, and is rated as an area in which the daily limit value by the indicator of fine particulate matter (PM_{10}) and the upper assessment threshold (UAT) of polycyclic aromatic hydrocarbons (PAH) have been exceeded.

For the protection of ambient air quality in the European Union (EU) there are a series of regulatory documents implemented and accepted for regulation of the minimum allowed concentrations of pollutants, measures which are to be undertaken by the member-states for the improvement of ambient air cleanness, requirements to passing national and local legislation, strategies, programmes, etc. The framework directives on the air quality management are the key element of the European Union strategy for air quality improvement in general.

The requirements of the European legislation have been transposed at a national level with the Clean Air Act (CAA) (*State Gazette No. 45 from 28.05.1996, amended State Gazette No. 12 from 03.02.2017*) and the secondary legislation system.

System description

The monitoring of ambient air quality and its control are performed by the AAQ National Monitoring System, a part of the Environment National Monitoring System (ENMS). It is serviced by the Executive Environment Agency (ExEA) with the Ministry of Environment and Water (MOEW). The analysis of the ambient air quality data is performed by districts and the specificity of every settlement in which control is exercised is taken into account.

The monitoring and control of ambient air quality on the territory of the Municipality of Blagoevgrad is performed by a permanent monitoring point – AMS of Blagoevgrad. In compliance with the requirements of article 11 Addendum No. 6 of Regulation No. 12 from 2010 on limit values for sulphur dioxide, nitrogen dioxide, particulate matter, lead, benzene and ozone levels in ambient air (SG No. 58/2010), the AMS of Blagoevgrad is an urban background point located in the urbanised part of the town without predominant influence of emissions of industrial and other activities. The scope of the AMS of Blagoevgrad is 100 m - 2 km, and it is located on the stage of the Hydro-meteorological observatory of Blagoevgrad with the NIMH-BAS, branch of Kyustendil.

The AMS of Blagoevgrad controls the main indicators of AAQ under article 4 of the Clean Air Act (Directive 96/62/EC), 2 extra (Toluene and P-Xylene), and is also equipped with a standard set of meteorological parameters (SSMP).

Fine particulate matter

Depending on its size fine particulate matter is divided into: PM_{10} – particles with a diameter below 10 microns, and $PM_{2.5}$ – particles with a diameter below 2.5 microns. Fine particulate matter is either emitted directly in the atmosphere (primary PM) or is formed in the atmosphere (secondary FPM). The primary fine particulate matter originates from natural sources or from anthropogenic ones. The natural sources include sea salt, naturally suspended dust, pollens, emissions originating from forest fires and volcanic ash. The anthropogenic sources include exhaust fuel emitted by heat power stations, incinerators, domestic heating for households, exhaust fuel from vehicles, worn-out vehicle parts (tyres and brakes), emissions from worn-out road pavements, as well as other types of anthropogenic dust. In cities exhaust gases from vehicles make a significant source of pollution, as well as repeated suspension of dust on road, as well as burning wood, fuel and coal for household

heating. These are all the sources emitting near to the ground surface thus bringing to a significant impact on the levels of FPM in environment.

Indicator definition

➢Number of times the DLV for PM_{10} is exceeded.

➢DLV for the protection of human health in a calendar year is 50 µg/m^3 and should not be exceeded more than 35 times within a calendar year.

➢Exceeded annual average limit (AAL) of PM_{10}

➢AAL for the protection of human health is 40 µg/m^3 .

Indicator assessment

The pollution with PM_{10} remains a major problem for the ambient air quality at a national level. A source of the registered above-the-standard pollution are the household, transport and industrial activities on the territory of the municipality of Blagoevgrad, as well as the polluted and poorly maintained road pavement. The unfavourable weather conditions, as well as the prolonged periods of low velocity of wind flows and durable dry spells contribute in addition to the ambient air pollution with particulate matter. The specific location of the municipality - in a structural basin in the shadows of the three mountains predetermines a good protectedness. The morning and evening wind speeds are small. At night the cold air masses coming down the mountain slopes shift warm air in the basin resulting in the formation of large temperature inversions. The share of calm windless weather is significant – up to 75% of all the observations. A weather element of the strongest influence on the distribution of harmful substances emitted into the atmosphere is the wind. The concentration of pollutant from permanently acting sources is inversely proportional to the wind speed, and if the wind flow direction is steady, the pollution is greater than at wind with changeable directions.

Table 3-49: Average wind speed and number of "windless" cases for years 2014 and 2016 by data of the NIMH for the municipality of Blagoevgrad.

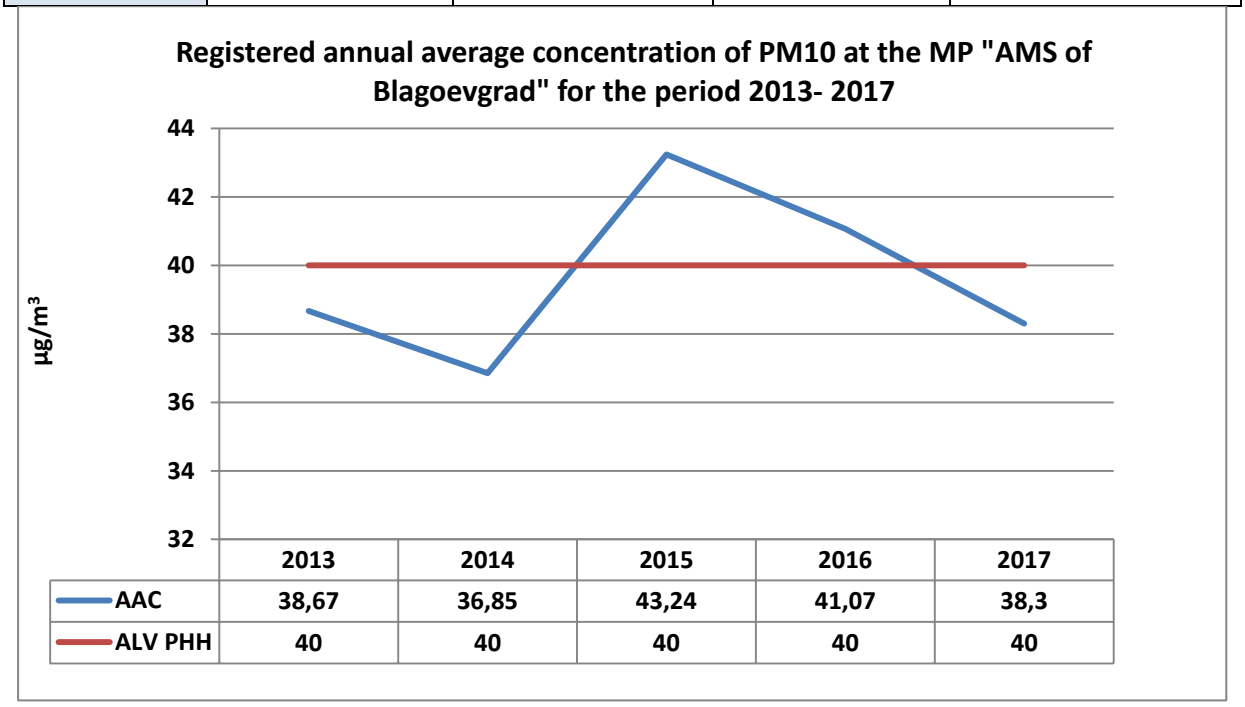
Parameter	2014	2016
Average wind speed, m/s	1.47	2.74
Case of windless % (from 0.0 to 0.5m/s)	40.0	28.0

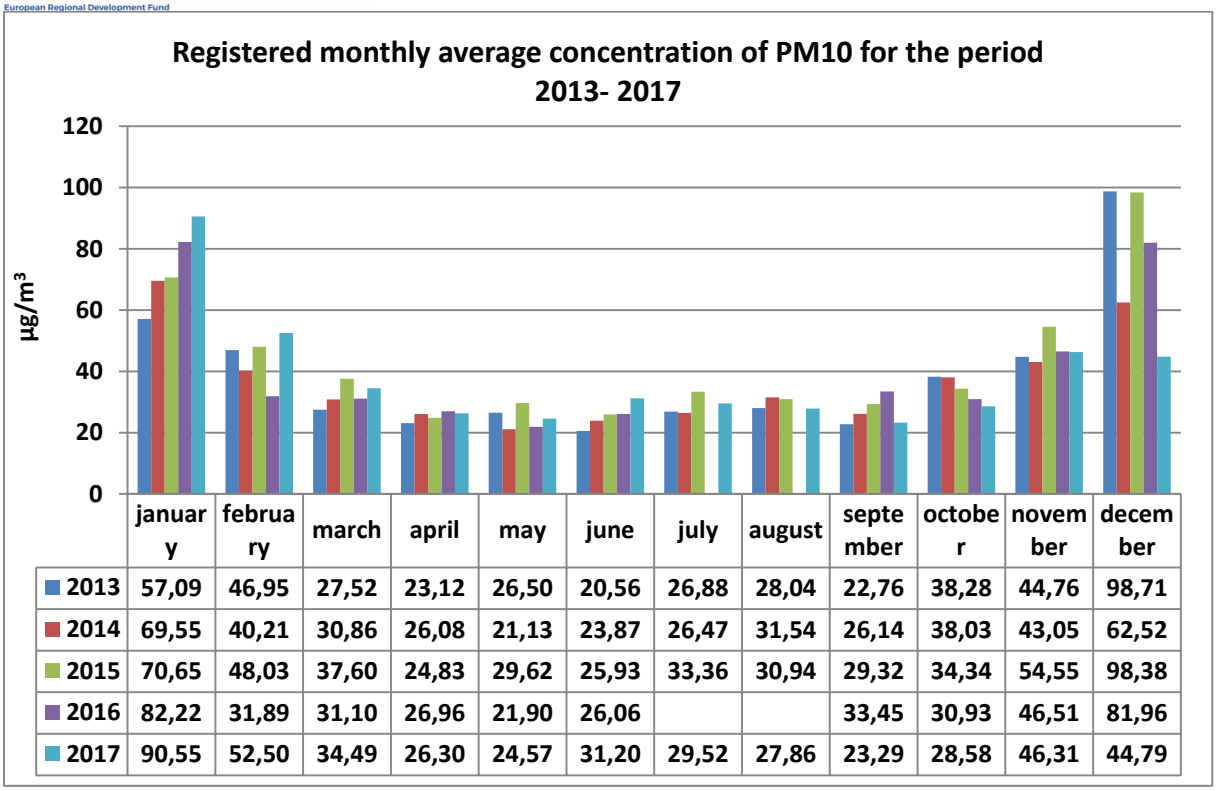
The analysis of wind speed date (Table 3-49) shows that the cases in the district with a wind speed below 1.5 m/s exceed 25%. According to the directives of the European Commission in communication COM(2008) 403 final, wind speed below 1.5 m/s is deemed unfavourable for dispersion. In such cases the convective transfer of particles is largely unfavoured and the dispersion is carried out mainly based on molecular diffusion – dispersion takes place at a very low speed.

Table 3-50 below provides a description of summarised data of the registered levels of PM_{10} at the AMS of Blagoevgrad. They show the picture of pollution with fine particulate matter of the ambient air within the period 2013 – 2017.

Table 3-50: Fine particulate matter (PM_{10}).

year	Number of data registered [number of 24 hour concentrations] at the point AMS of Blagoevgrad	Maximum measured daily average concentration [µg/m^3]	Number of times of exceeded TV for DLV [50 µg/m^3]	Annual average concentration [µg/m^3] [ALV- 40 µg/m^3]
2013	356	231.46 (24.12.2013)	69	38.67
2014	352	165.04 (01.01.2014)	62	36.85
2015	357	270.6 (10.01.2015)	78	43.24
2016	296	194.08 (25.01.2016)	52	41.07
2017	364	192.98 (12.01.2017 r)	65	38.3





	january	february	march	april	may	june	july	august	september	october	november	december
2013	57,09	46,95	27,52	23,12	26,50	20,56	26,88	28,04	22,76	38,28	44,76	98,71
2014	69,55	40,21	30,86	26,08	21,13	23,87	26,47	31,54	26,14	38,03	43,05	62,52
2015	70,65	48,03	37,60	24,83	29,62	25,93	33,36	30,94	29,32	34,34	54,55	98,38
2016	82,22	31,89	31,10	26,96	21,90	26,06			33,45	30,93	46,51	81,96
2017	90,55	52,50	34,49	26,30	24,57	31,20	29,52	27,86	23,29	28,58	46,31	44,79

The graphic clearly shows the influence of seasons on the PM_{10} concentrations registered at the AMS of Blagoevgrad. For the period November – February coinciding with the season in which heating is used, the average annual concentrations of PM_{10} registered reach levels of up to 90 µg/m^3, exceeding almost twice the TV of the DLV of 50 µg/m^3. In the seasons in which no heating is used the DAC are considerably lower, and in the period April-September the monthly average concentrations are maintained in the interval 23- 33 µg/m^3. During the cold half of the year (the months of the first and fourth quarters) the levels of PM_{10} concentration are considerably higher than those during the warm half of the year. This proves that household heating in the winter months is the major influencing factor on the air pollution with PM_{10}. The situation with the registered numbers of DAC exceeding the TV of DL VPHH is similar. In principle there is a direct relationship between the monthly average temperatures registered and the quantity of fuel used for household heating, and it is inversely proportional. The quantity of exhaust fuel is in direct ratio to the capacities (mass flows) of the atmospheric emissions formed in the process of combustion. The analysis of the registered results, however, does not justify a conclusion that there is an unambiguous dependency between the monthly average temperature and the levels of the averaged monthly concentrations of PM_{10} registered by the AMS of Blagoevgrad for the respective month.

Ozone

In contrast to the other pollutants the surface (tropospheric) ozone is not emitted directly into atmosphere, but is formed through complex chemical reactions, the subsequent emissions of precursory gases like nitrous oxides (NOx – a group of gases including NO and NO_2) and non-methane volatile organic compounds (NMVOC) of natural and anthropogenic origin, in the presence of sunlight and high temperatures. Methane (CH_4) and carbon oxide (CO) also play a role in the

formation of ozone. Due to the fact that the formation of ozone requires sunlight, an increase of the concentrations is clearly observed in the direction from the northern to the southern parts of the continent. Ozone concentration typically grows with the increase of altitude, and therefore high concentrations are observed at the stations located at higher altitudes. Near the surface ozone decomposes through surface precipitation or through a reaction of titration with the emitted NO, at which NO_2 is formed. Ozone concentration is high at country (remote) stations, lower at the urban background stations and even lower at the transport points where ozone decomposes quickly. Ozone is the main component of the urban "smog".

The meteorological conditions also influence the formation of ozone. Hot and dry summers with long periods of high atmospheric pressure bring to increased levels of ozone. Ozone is a strong and aggressive oxidiser that can have a harmful effect on human health. It affects the respiratory system causing breathing problems, asthma, reduced lung function and other diseases of the respiratory system. Elderly people and small children are particularly susceptible.

The high levels of ozone may damage vegetation, too, affecting adversely its growth and reproduction bringing to decreased crop yields, it damages the growth of forests and reduces bio diversity. Ozone hinders photosynthesis this way obstructing the absorption of carbon dioxide. Ozone increases the degradation of buildings.

Indicator definitions

➢Number of days with exceeded short-term target limits (STL) – the maximum eight-hour average value within a day of 120 μg/m^3 should not be exceeded in more than 25 days per year, averaged for a three-year period;

➢Number of exceeded thresholds for informing the population - 180 μg/m^3;

➢Number of exceeded thresholds for warning the population - 240 μg/m^3 exceeded within three consecutive hours;

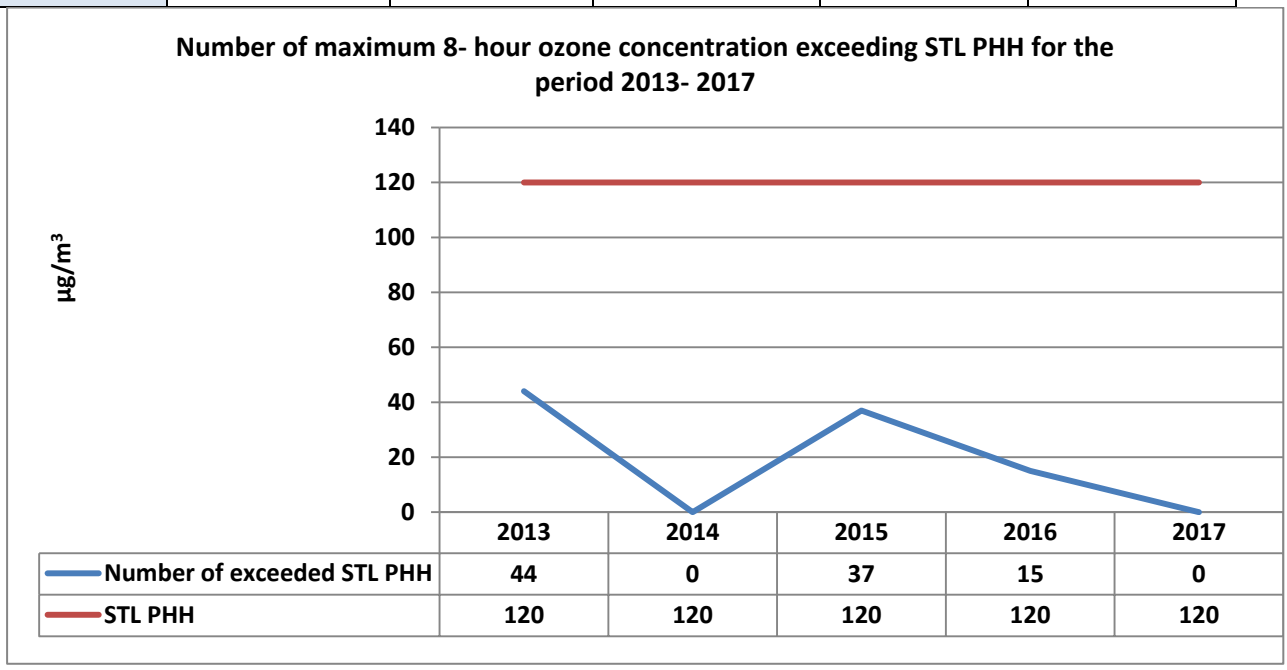
Indicator assessment

For the period 2013 - 2017 at the AMS of Blagoevgrad no concentrations have been registered exceeding the threshold for informing the population (180 μg/m^3) and the threshold for warning the population (240 μg/m^3) ^{in} the course of three consecutive hours. Table 3-51 show the number of exceeded TV of STL (120 μg/m^3) for the period 2013- 2017

Table 3-51: Ozone.

Year	Number of exceeded TV of STL [120 μg/m^3] at the point of AMS of Blagoevgad	Maximum (8-hour) concentration measured [μg/m^3]	Maximum hourly average concentration measured [μg/m^3]	Number of exceeded thresholds for informing the population /1 h/ [180 μg/m^3]	Number of exceeded thresholds for warning the population /1 h/ [240 μg/m^3]

2013	**44**	**135.45**	**142.83**	**0**	**0**
2014	**0**	**112.3**	**128.72**	**0**	**0**
2015	**37**	**133.91**	**145.71**	**0**	**0**
2016	**15**	**127.13**	**145.87**	**0**	**0**
2017	**0**	**117.92**	**123.87**	**0**	**0**



Sulphur dioxide

Sulphur dioxide is emitted at the combustion of sulphur-containing fuels. The main anthropogenic source of sulphur dioxide is the combustion of natural fuels (Heat Power Stations, household sources). Sulphur dioxide enters the body through the respiratory system.
The short-term exposure to sulphur dioxide affects mainly the respiratory system. There is a great variety of individual sensitivity of population to sulphur dioxide, but people suffering from bronchial asthma are among the most susceptible persons. The effect of sulphur dioxide on the respiratory system as a rule is combined with the effect of dust.
Groups of population sensitive to the exposure of sulphur dioxide are children, elderly people, people suffering from asthma, cardiovascular diseases or chronic lung diseases. It is hard to distinguish the effect of sulphur dioxide from that of dust, to which the raised frequency of hospitalisations and deaths is also related. People suffering from asthma are 10 times more sensitive to sulphur dioxide than healthy people.

Indicator definition

➢Number of exceeded HLV for the protection of human health for sulphur dioxide of 350 µg/m^3 (the limit value should not be exceeded more than 24 times within a calendar year);
➢Number of exceeded DLV for the protection of human health for sulphur dioxide of 125 µg/m^3 (the limit value should not be exceeded more than 3 times within a calendar year);

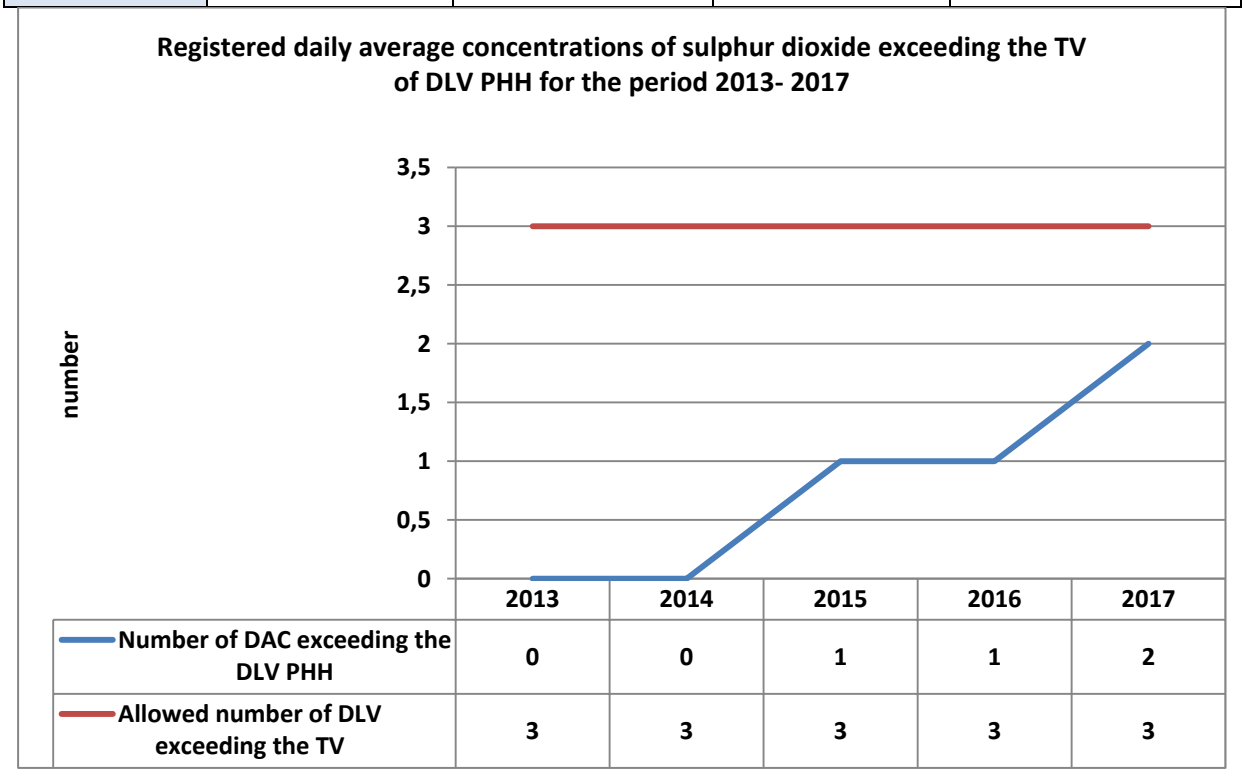
➢Number of exceeded thresholds for alerting the population - 500 µg/m^3 exceeded within three consecutive hours.

Indicator assessment

In Table 3-52 and with graphic means summarised data are presented of the levels of SO_2 registered at the AMS of Blagoevgrad. They show the picture of ambient air pollution with sulphur dioxide for the period 2013 – 2017. Within the period studied the HLV for the protection of human health (350 µg/m^3) has not been exceeded more than 24 times a year, and the DLV for the protection of human health (125 µg/m^3) has not been exceeded more than 3 times a year. In January 2017 the DLV was registered as exceeded twice which resulted from the low temperature and the increased consumption of solid fuels (wood and coal) in household heating

Table 3-52: Sulphur dioxide.

Year	Number of exceeded TV for HLV [350 µg/m^3] at the point of AMS - Blagoevgrad	Maximum measured (hourly average) concentration [µg/m^3]	Number of exceeded TV for DLV [125 µg/m^3]	Maximum daily average concentration measured [125 µg/m^3]
2013	0	142.83	0	105.25 (29.05.2013)
2014	0	292.75	0	87.08 (29.01.2014)
2015	0	305.96	1	185.15 (07.12.2015)
2016	1	360.69	1	128.85 (26.11.2016)
2017	4	450.07	2	142.82 (22.01.2017)



Nitrogen dioxide

Nitrogen dioxide is a gas formed mainly at the oxidation of nitrous oxide (NO). High-temperature combustion processes (from engines of cars and electric power stations) are the main sources of nitrous oxides (NO and NO_2). The larger share of the NOx emissions are NO emissions, and 5% to 10% are NO_2. Diesel vehicles make an exception emitting more than 70% NO_2 from NO_x. The main source of pollution, in particular in the big cities is the road transport. The number of vehicles is growing all the time. A large share of them features a long operation period and bad environmental characteristics. Air pollution by the part of the motor transport may be analysed indirectly by the levels of nitrous oxides in the ambient air.

Effect on human health

Nitrogen dioxide is a pollutant affecting mainly the respiratory system causing health problems like changes in lung function and increased susceptibility to lung infections.

Indicator definition

➢Number of exceeded HLV for human health protection for nitrogen dioxide in ambient air of 200 µg/m^3 (it should not be exceeded more than 18 times within a calendar year);

➢ALV for human health protection for nitrogen dioxide is deemed exceeded upon registered annual average concentration of nitrogen dioxide over 40 µg/m^3;

➢Number of exceeded thresholds for alerting the population - 400 µg/m^3 exceeded within three consecutive hours.

Indicator assessment

At the AMS of Blagoevgrad within the period 2013 – 2017 no exceeded HLV for human health protection (200 µg/m^3) have been registered, as well as exceeded annual average limit (40 µg/m^3).

Benzene

Benzene is formed at the incomplete combustion of fuels. Benzene is a petrol additive and more than 80% of it emissions are due to vehicle traffic in Europe. Other sources are household heating and oil refinement, as well as the conveyance, distribution and storage of petrol. Burning wood may be a significant local emitter of benzene.

Benzene decomposition in atmosphere takes place mainly through photochemical degradation. Such degradation contributes to the formation of ozone although the chemical reactivity of benzene is relatively low. Benzene is a carcinogen. The most significant adverse effect of continuous exposure is the damage of genetic material of cells. Chronic exposure to benzene could damage bone marrow.

Indicator definition

➢Exceeded limit value for the protection of human health for benzene is registered if the annual average concentration exceeds the limit value of 5 µg/m^3.

Indicator assessment

For the period 2013 - 2017 at the monitoring point "AMS of Blagoevgrad" no exceeded annual average limit values for the protection of human health for benzene have been registered.

Polycyclic aromatic hydrocarbons (PAH)

Poly-aromatic (polycyclic) hydrocarbons make a large group of compounds with two or more benzene nuclei. They are formed to the largest extent at combustion processes mainly at incomplete combustion of coal and diesel fuel. There are several hundreds of PAH. Control of PAH in ambient air is established through benzo(a)pyrene, isolated in samples of $FPM_{10.}$ In compliance with Directive 2004/107/EC, transposed into the national legislation by Regulation No. 11 on limit values for arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons in ambient air, published in SG No. 42 from the 29th May 2007 (Regulation No. 11/2007), in the EU countries a single target annual average limit value is to be applied for the contents of PAH (determined as benzo(a)pyrene) in ambient air of 1 ng/m^3, and it is to be achieved as of 31.12.2012 and maintained thereafter.

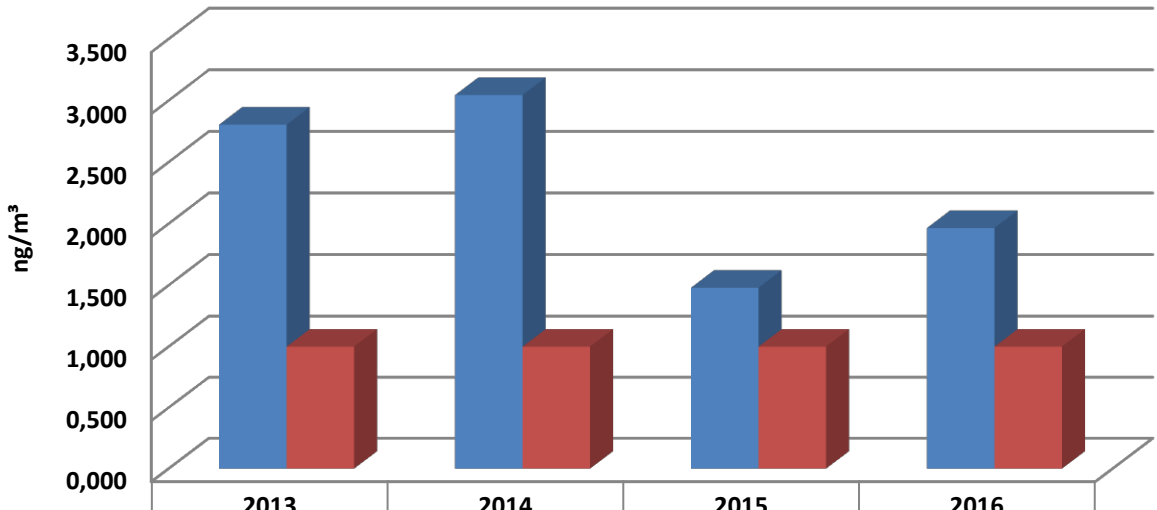
On the territory of the Municipality of Blagoevgrad the contents of polycyclic aromatic hydrocarbons in ambient air is monitored at the point "AMS of Blagoevgrad". Data of the measured concentrations of benzo (a) pyrene (as total contents of the pollutant in the fraction of FPM_{10}) within the period 2013 – 2016 is presented below in the form of a table and graphic.

Table 3-53: Concentrations of B(a)P within the period 2013 -2016.

Year	Indicator	Measurement unit/ Quarter	I	II	III	IV	Annually
	1	2	3	4	5	6	7
2013	Samples	pcs.	26	32	32	30	120
	MC*	ng/m³	14.71	1.55	0.9	27.2	27.2
	AC**	ng/m³	3.95	0.22	0.15	4.95	**2.192**
2014	Samples	pcs.	10	8	30	31	79
	MC*	ng/m³	0	0	0.6	30.7	30.7
	AC**	ng/m³	0	0	0.059	5.313	**3.044**
2015	Samples	pcs.	30	28	22	19	99
	MC*	ng/m³	11,7	3,78	0,98	4,75	11,7
	AC**	ng/m³	3,32	0,407	0,068	1,662	**1,4802**
2016	Samples	pcs.	30	31	30	30	121
	MC*	ng/m³	22,20	0,94	0,368	14,76	22,20
	AC**	ng/m³	4,35	0,126	0,012	3,44	**1,965**
*MC – maximum concentration for the period							
**AC – average concentration for the period							

Source: RIEW Blagoevgrad

Annual average benzo (a) pyrene concentrations registered for the period 2013-2016



	2013	2014	2015	2016
AAC	2,804	3,044	1,480	1,965
AATLV	1,000	1,000	1,000	1,000

Heavy metals

Arsenic, cadmium, lead and nickel are emitted mainly as a result from various industrial activities and coal combustion. Although the atmospheric concentrations of such metals are relatively low, they contribute to the deposition and growth of contents of heavy metals in soil, sediments and organisms. Heavy metals do not decompose in environment, they are bio accumulated, i.e. they are gradually accumulated by plants and animals and cannot be separated from them. This means that plants and animals can be poisoned for a long period of time through exposure even to small quantity of heavy metals. The AMS of Blagoevgrad does not measure heavy metals as within the region there are no industries that could contribute to the ambient air pollution with heavy metals.

Carbon oxide

Carbon oxide is gas emitted at the incomplete combustion of fossil fuels and bio fuels. The road transport was a significant source of emissions but the introduction of catalysers brought to a significant decrease in emissions. The highest concentrations are measured in urban areas during the peak hours of the day. Carbon oxide is not measured at the MP AMS of Blagoevgrad.

Indicator definition

➢Exceeded limit value for the protection of human health is registered when within a year more than one eight-hour values exceeding 10 mg/m^3 are registered.

Conclusion

Ambient air quality in the municipality of Blagoevgrad is good. The impact of the group of sources of "household heating" on the AAQ in the municipality of Blagoevgrad with regard to FPM_{10} can be assessed as ambiguous. For the larger part of the territory of the municipality and the residential districts with population below 500 residents its effect can be estimated as low. In such areas during the season when heating is sued household heating forms surface concentrations of approx. 20 - 30 $\mu g/m^3$, not exceeding the TV of DLV PHH. The only district for which the household heating impact on the AAQ with regard to FPM_{10} can be estimated as "significant to strong" is the territory of the town of Blagoevgrad. During the season when heating is used it becomes a main source of pollution with FPM_{10} and could alone cause the formation of surface concentrations exceeding the DLV PHH of 50 $\mu g/m^3$. In extreme situations household heating could alone bring to surface concentrations exceeding the DLV PHH by two times. This conclusion is fully confirmed by the data provided by the AMS of Blagoevgrad. The effect of household heating for the formation of AA concentration for the town of Blagoevgrad could also be stated as significant. The impact of the group of sources "household heating" on the AAQ in the municipality of Blagoevgrad with regard to B(α)P could be assessed as significant. Regardless of its seasonal character household heating could alone bring to the formation of surface concentrations exceeding the AATLV of 1 ng/m^3 by 4 times.

Chapter 4: SWOT Analysis

4.1 SWOT Analysis of Study Area 1

SWOT analysis (acronym for Strengths, Weaknesses, Opportunities and Threats), is a method that can be applied to identify key factors that are favorable/unfavorable to achieve an objective related to a company, industry, product or a place. It is usually applied to profit-seeking organizations but can be used to examine various systems if a desired state – objective is defined. In this Chapter, a SWOT analysis is performed and presented for the Study Area 1, with a view to identify major internal and external factors that are important for developing a strategy towards sustainable development and protecting the biodiversity of NP-EMATH. During a SWOT analysis key information is grouped into two main categories:

1) Internal factors: includes the identification of the strengths and weaknesses internal to the system under examination (e.g. human resources, physical resources, financial capacity, past experiences etc.).

- **Strengths** refer to the characteristics of the system that are helpful to achieving the defined objective and give it an advantage over others.
- **Weaknesses** refer to the characteristics of the system that are harmful to achieving the defined objective and place it at a disadvantage over others.

2) External factors: includes the identification of the opportunities and threats derive from the external environment of the system under examination (e.g. demographics, legislation, national/international economy, technological change etc.).

- **Opportunities** refer to the characteristics of the external environment that can be exploited to benefit the examined system and its objective.
- **Threats** refer to the characteristics of the external environment that can undermine the examined system and its objective.

The Strengths/Weaknesses/Opportunities/Threats for NP-EMATH were extracted through the following processes:

- Analysis of the information included in this study and especially Chapter 2 that includes analytical inventories and data on key issues that affect the environmental sustainability of NP-EMATH.
- Examination of regional long-term strategic plans such as the RIS3 of East Macedonia and Thrace and Sustainable Energy Action Plans of municipalities.
- Analysis of the annual reports published by the Management body of the Nestos Delta and Lakes Vistonida – Ismarida and personal communications.
- Examination of relevant legislation and trends in European Union regarding funding schemes and future goals.

•Examination of relevant studies performed for other protected areas that can be found in literature worldwide.

Strengths

The key Strengths (S) of the National Park of Eastern Macedonia and Thrace are summarized as follows:

➢S1: Presence of habitats of significant biodiversity and ecological value – richness of flora and fauna. The wetland complex of NP-EMATH is one of the most significant in Greece due to the extent of the area it covers and its important biological, aesthetic, geomorphologic and pedagogical value.

➢S2: Proximity with well-known tourist destinations that attract a significant number of visitors annually (e.g. Thasos Island). As a result, new audiences can be easily reached to communicate results and promote actions.

➢S3: Sufficient transport network. The area is accessible be various means (presence of highway, local roads, train station, airport, harbor) a characteristic that greatly supports the economic growth and development of the area as well the attraction of tourists.

➢S4: Significant availability of pastures and forestry/fishery resources.

➢S5: Presence of a significant number of high value products in the primary sector.

➢S6: Mild climate. According to the Köppen climate classification the climate of the area is Csa sub-type which indicates mild temperate climate with hot dry-summers.

➢S7: Significant incentive for the local communities through green entrepreneurship, job creation and tourism development.

➢S8: Comparatively high production of electrical energy from renewable sources (especially from PV systems). This leads to a reduced carbon footprint of the wider area in comparison with other regions in Greece.

➢S9: Favorable attitude of government agencies, public bodies (e.g. municipalities) and local associations towards initiatives to protect the natural habitat.

➢S10: Availability of extensive data regarding flora and fauna and environmental media for the area.

➢S11: Existence of two Information Centers in the area (information centers of Lake Vistonida in Porto Lagos and Delta Nestos in Keramoti).

➢S12: Existence of the Democritus University of Thrace including 20 departments and over 20,000 students scattered in the Thrace area.

Weaknesses

The key Weaknesses (W) of the National Park of Eastern Macedonia and Thrace are summarized as follows:

➢W1: Significant human activity within the boundaries of NP-EMATH that increases the risk of potential environmental impacts (e.g. poaching, fires, illegal logging, livestock/processing plant wastes, urban waste water).

➢W2: Specialization in crops that is not currently dynamic in terms of demand and competiveness (e.g. cotton, beet, tobacco).

➢W3: Small and diversified size of farms that are disproportional to production costs making them uncompetitive.

➢W4: Minimal effort for product innovation and absence of intermediary bodies supporting innovation and knowledge sharing (e.g. technological parks, incubators).

➢W5: Lack of environmental awareness of the local community. This is basically attributed to the relatively aging population of the area that lacks ecological consciousness.

➢W6: Lack of infrastructures and fundamental facilities such as accommodation (3 star and over hotels and resorts), ecotourism agencies, public transport, recreation areas to support thematic tourism.

➢W7: Lack of educational programmes on ecological issues and sustainability practices (e.g. focusing on green agriculture, green tourism, etc.).

➢W8: Insufficient financial support to the management body of NP-EMATH for efficiently monitoring illegal activities within the boundaries of the area.

➢W9: Lack of recognizability as an eco-tourist destination.

➢W10: Low annual income of residents in comparison with other regions of Greece that hinder the application of energy efficient and environmentally friendlier actions by individuals (e.g. renovations).

Opportunities

The key Opportunities (O) of the National Park of Eastern Macedonia and Thrace are summarized as follows:

➢O1: Constant increase of international touristic interest, especially regarding alternative types of tourism such as ecotourism, agrotourism, bird watching, rural tourism and adventure tourism. The area presents a great potential to increase its tourism. The total overnight stays in all types of accommodation and camping for 2010 reached 1.6 millions in the Prefecture of Eastern Macedonia and Thrace where the NP-EMATH belongs to, whereas the overall number for Greece was 66.8 million (a share of only 2.4%). Additionally the average duration of stay was 2.9 days whereas the respective value for Greece was 4.7 days.

➢O2: Increased dynamics of the aquaculture industry in the international market. Combined with the significant availability of fishery resources in the area and product processing, can act as an axis of development.

➢O3: Area is transformed from a border area, into a gate in EU and Greece. The geographical position of the area can serve as a node for imports and exports and large scale energy investments (i.e. LNG in Alexandroupolis, railroad network with Burgas – Varna – Ruse).

➢O4: Production of eco-products. Demand on high quality, environmental friendlier products is on the rise worldwide.

➢O5: Conserving natural ecosystems and making effort to decrease negative impacts. The efficiency of procedures (e.g. monitoring of illegal activities) for the conservation and protection of the ecosystems can be increased.

➢O6: Existence of the legislative framework which allows the conservation of the protected areas. Future legislation and strategic goals in EU and National level are paying more and more, high attention to biodiversity protection. Additionally, the area of responsibility of the management bodies is expected to be significantly increased (e.g. by including NATURA sites) in the near future.

➢O7: Increasing funding schemes and programs for protecting the biodiversity and promoting sustainable development and circular economy.
➢O8: International cooperation and development of networks with relevant agents – management bodies of other protected areas.
➢O9: Utilization of local scientific staff (NP-EMATH is in close proximity with two universities and two other protected areas and respective bodies).
➢O10: Extensive potential for advertising – promoting the area.

Threats

The key Threats (T) of the National Park of Eastern Macedonia and Thrace are summarized as follows:
➢T1: Unfavorable environment for entrepreneurship in Greece (due to legislation, bureaucracy, taxation, access to funding schemes).
➢T2: Exposure to competition with other areas (both within Greece and near countries) characterized by increased productivity or cheaper costs.
➢T3: Leakage of experienced staff to more attractive Greek or European regions.
➢T4: Lack of interest by the local communities, tourist suppliers and respective agents to participate in initiatives for protecting the natural habitat of the area and take action and/or change habits.
➢T5: A high increase in tourists can lead to increased direct and indirect environmental impacts.
➢T6: Presence of energy consuming building stock in the region and energy intensive public buildings with increased saving needs.
➢T7: Risks due to Climate change and ecological disasters (such as coastal erosion, floods, heat waves etc.).
➢T8: Low level of extroversion. The contribution of the Prefecture of Eastern Macedonia and Thrace where the NP-EMATH belongs to, accounts for only 3% of all Greek exports (in terms of Euros).
➢T9: Overproduction and overconsumption (due to increased population, tourists, business and industrial activity) can lead to the degradation of the local sources and ecosystems and high ecological footprint (disruption of carrying capacity).
➢T10: The area of responsibility of the management body is expected to be significantly increased (e.g. by including NATURA sites) in the near future, thus leading to lack of resources (both funding and personnel).

The results of the SWOT analysis are summarized in a form of a matrix in Figure 4-1. To better understand the level of impact of the BIO2CARE Project for developing a strategy towards sustainable development and protecting the biodiversity of NP-EMATH, the Strengths, Weaknesses, Opportunities and Threats that are directly related to the objectives, deliverables and results of the BIO2CARE Project were highlighted (in bold font).

The BIO2CARE Project will reinforce the protected areas capacity to preserve and protect the environment and biodiversity while in parallel promoting actions that set the background for sustainable development (e.g. through training campaigns, the development of circular economy models, special software for environmental assessment and others).

	Favorable	Unfavorable
Internal Factors	**Strengths** **S.1** / S.2 / S.3 **S.4** / S.5 / S.6 **S.7** / **S.8** / S.9 **S.10** / S.11 / S.12	**Weaknesses** **W.1** / W.2 / W.3 **W.4** / **W.5** / **W.6** **W.7** / **W.8** / W.9 W.10
External Factors	**Opportunities** O.1 / O.2 / O.3 **O.4** / **O.5** / **O.6** **O.7** / **O.8** / **O.9** **O.10**	**Threats** T.1 / T.2 / **T.3** **T.4** / **T.5** / **T.6** **T.7** / T.8 / **T.9** T.10

Figure 4-1: SWOT analysis of NP-EMATH (Study Area 1).

4.2 SWOT Analysis of Study Area 2

The Strengths/Weaknesses/Opportunities/Threats for Rila NP were determined through the following processes:

•Analysis of the information included in Chapter 3 – reports of experts on the status of nature components and anthropogenic activities affecting Rila NP and in particular the catchment area of Blagoevgradska Bistritsa River.

•Review of strategic development documents concerning the study area – e,g, the District Development Strategies of Blagoevgrad and Kyustendil Districts, and the development strategies of the municipalities which include parts of Rila NP and at the same time fall within the eligible area of the Interreg V-A Programme Greece – Bulgaria 2014-2020.

•Analysis of the Management Plans of relevant protected areas, starting with Rila NP itself but also the Management Plans of the other two Bulgarian national parks (Pirin, Central Balkan) and the 11 nature parks with focus on Rila Monastery Nature Park as it is directly adjacent to the territory of Rila NP.

•Examination of relevant legislation in Bulgaria, e.g. the Protected Areas Act and the Order for Development of Management Plans for Protected Areas.

•Examination of relevant studies performed for the study territory / related territories in BG / related themes.

Strengths

The key Strengths (S) of Rila National Park / catchment area of Blagoevgradska Bistritsa River are summarized as follows:

➢S1: Rila National Park is a protected area of national and international importance and is an exclusive state property. Four reserves with strict conservation regime fall within the territory - Parangalitsa, Central Rila Reserve, Skakavitsa and Ibar.

➢S2: The flora and fauna diversity is enormous. There are 313 species of mosses (42% of Bulgaria's resources) and 1338 vascular plants, of which 398 species are medicinal. There are many Bulgarian and Balkan endemics, plus many relic species. The forest fund is amounting to 71.76%. Animal life is presented by 2934 invertebrates and 172 vertebrates, many of which protected by Law.

➢S3: Rila Mountain is one of the richest in water resources in the country. The Park has a deep and dense river network; snow cover lasts for quite some time which maintains the hydrological regime. There are also many lakes and springs. The ecological status of waters is high or good.

➢S4: On the territory of the Park, there are many opportunities for sustainable activities regulated by special park plans. For example, the vast grass habitats are suitable for grazing and hay collection. There are substantial resources of blackberries and other forest fruits and mushrooms which local people collect, mostly for personal use.

➢S5: Rila Mountain is among the emblematic natural sites of Bulgaria which has attracted nature lovers, tourists and scientists long before the protected areas designation. Good conditions for tourism are offered not only by the lower parts and the adjacent territories but also by the Alpine zones above the upper edge of forests.

➢S6: No industry is developing within the park. The percentage of buildings and other construction is low. There are no settlements or permanent human inhabitants. There are also no roads from the national road system on the territory of the park. There are sufficient capacities of tourist accommodation and other specialized infrastructure within the park; no need to construct new facilities.

➢S7: Energy consumption in the park is limited to tourist facilities: huts, lifts, winter sports infrastructure. Energy production is limited to few small water power plants.

➢S8: There are no big industrial pollutants in the adjacent territories of the park. Generation of solid waste is decreasing slowly due to migration of people out of the area.

➢S9: Local and regional development plans declare support to nature protection and sustainable development. They all define Rila NP as one of the biggest assets of the region.

➢S10: The scope and diversity of educational activities in the park is growing; the number of children included in the Park's programmes is higher every year. Information campaigns organized by the Park Directorate cover adults too.

➢S11: The Park Directorate has a number of local partners from the adjacent territories but also from the whole country – public structures, NGOs, scientific and educational institutions, businesses and ordinary citizens.

➢S12: The ecological status of Blagoevgradska Bistritsa River catchment area as a whole is high to good despite the existence of Blagoevgrad which is the biggest urban center and correspondingly a source of human pressure in the whole adjacent area of Rila National Park.

➢S13: On the contrary, Blagoevgrad has very positive social and economic influence on the whole region as it offers jobs and has many resources for sustainable development, especially tourism and active cultural life.

Weaknesses

The key Weaknesses (W) of the National Park of Rila are summarized as follows:

➢W1: The budget of Rila NP Directorate is insufficient for good maintenance of tourist facilities incl. marked trails and publishing enough materials for the high number of visitors. It is also difficult to keep qualified staff in all park sections. A good system for monitoring and overall management of visitor flows / anthropogenic activities is missing too.

➢W2: As the territory of the park, resp. its adjacent areas, are large, there are many stakeholders and institutions involved in various aspects of use and management, and coordination between all of them is a challenge.

➢W3: General lack of understanding of the role and importance of protected areas in terms of environment health but also in terms of sustainable economic opportunities such as eco-tourism or revival of traditional crafts and other livelihood practices.

➢W4: Despite the fact that local municipalities have declared their strive for sustainable development, there is quite a number of investment interests – for example ski infrastructure development – that is not in line with the purposes of Rila NP as a protected area.

➢W5: Low capacity of local population to develop sustainable tourism or other environmentally-friendly economic activities. Low levels of income and ageing of population.

➢W6: Big disparity between the adjacent territories. There is Blagoevgrad, for examples, with 6.7% unemployment and Yakorouda, with 48.4%.

➢W7: Significant air pollution in the settlements around the park in the winter, due to the heating on coal and wood. Energy efficiency is very low around the park.

➢W8: In some parts of the park and adjacent territories, flora is not natural but has been replaced by artificially created communities. One area with such a problem is the catchment area of Blagoevgradska Bistritsa River and its forestation.

➢W9: There is no complete (integrated) tourism product in the whole area of the park and especially in Blagoevgradska Bistritsa catchment area / Blagoevgrad. The region includes one of the most popular attractions of the whole of Bulgaria – the Rila Monastery – yet the existing visitor flow is not utilized at all.

➢W10: Low quality of tourism services and lack of tour operators offering the region. The potential of the two universities in Blagoevgrad is not utilized at all.

Opportunities

The key Opportunities (O) of the National Park of Rila are summarized as follows:

➢O1: Growing interest towards sustainable tourism as a whole and protected areas in particular on the global tourism market.

➢O2: Availability of many resources in the park and the adjacent territories that can become the basis for sustainable means of livelihood and business.

➢O3: Shift from mere agricultural production to SMEs which add value to this production (e.g. not sell grapes but wine; not fruits but jam or juice).
➢O4: Existing number of options to provide additional funds for achieving the goals of the protected territory and sustainable development of the whole region.
➢O5: Restoration of the natural state of zones / ecosystems that have been tampered with. Continue with the preservation of valuable natural assets.
➢O6: Utilization of the opportunities provided by the regions three borders (Greece, FYROM, Serbia).
➢O7: Utilization of existing human potentials such as the staff and students of the two universities of Blagoevgrad, the foreign languages high school, the Regional Historical Museum, etc., etc.
➢O8: Including the Park in as many international networks as possible (Rila NP was part of the PAN Parks Network but unfortunately it seized to exist).
➢O9: Certification of services, products and others, especially under international standards. Establishment of local geographic brands too. The Park Directorate must work closely with local communities for this.
➢O10: Use the town of Blagoevgrad as a motor for regional development, not only of Blagoevgradska Bistritsa River catchment area but the whole region of Rila NP. This includes the utilization of professional capacities in various spheres like for example project management and other.

Threats

The key Threats (T) of the National Park of Rila are summarized as follows:
➢T1: Illegal tree cutting. The latter leads to fragmentation and decreasing the qualities of certain habitats and micro-habitats in the park; change in the hydrological regime of rivers; deterioration of the soil layer, etc.
➢T2: Illegal hunting. It continues despite the regimes within the park. Poaching affects mostly larger mammals and some rare invertebrates, reptiles or bats. We should add here the killing of animals which are not usual subjects of hunting by the visitors of the park due to lack of information, fear or superstitions. Illegal fishing should added here which is related to using illegal means of fishing (electricity, chemicals), fishing in periods which are banned, and fishing protected species. Decrease in fish quantities affects other species such as the otter.
➢T3: Human-caused fires. They are the most drastic disturbance of habitats and all groups of species related to them.
➢T4: Large-scale interference with the natural water regime of the park. There are existing systems for collection, keeping and taking waters out of the region which threaten the natural conditions for formation of water flows. Uncontrolled construction of water power plants could also be a threat to the environment.
➢T5: Over-grazing or grazing of animals not typical for the park which could be disruptive for natural vegetation.
➢T6: Global climate change - high temperatures, more droughts and strong winds are expected to increase the occurrence of damage by winds, fires, calamities, etc.
➢T7: Unregulated tourist flows. The results of this threat are quite visible in the area of the Seven Rila Lakes. We should add here unregulated entry of vehicles which disturb sensitive species, not to mention pollution.

➢T8: Construction. This includes remnants of old construction activities scattered around the territory plus new large-scale infrastructure projects mostly related to winter sports.

➢T9: Deterioration of the quality of environment in the catchment area of Blagoevgradska Bistritsa River. This includes lower quality of waters as a result of local sources of pollution and taking water for irrigation in summer season, and also deterioration of the quality of air in Blagoevgrad if the rates of use of coal and wood for heating continue.

➢T10: Continuing negative trends in the demography and economy of the region. Less people mean less anthropogenic threats to the environment but also less opportunities to mitigate other negative trends.

The results of the SWOT analysis are summarized in a form of a matrix in Figure 4-2. To better understand the level of impact of the BIO2CARE Project for developing a strategy towards sustainable development and protecting the biodiversity of Rila NP, the Strengths, Weaknesses, Opportunities and Threats that are directly related to the objectives, deliverables and results of the BIO2CARE Project were highlighted (in bold font).

The BIO2CARE Project will reinforce the protected areas capacity to preserve and protect the environment and biodiversity while in parallel promoting actions that set the background for sustainable development (e.g. through training campaigns, the development of circular economy models, special software for environmental assessment and others).

	Favorable	**Unfavorable**
Internal Factors	**Strengths** **S.1** / **S.2** / S.3 **S.4** / **S.5** / S.6 S.7 / S.8 / **S.9** **S.10** / **S.11** / S.12 / S13	**Weaknesses** **W.1** / W.2 / **W.3** W.4 / **W.5** / W.6 W.7 / W.8 / **W.9** **W.10**
External Factors	**Opportunities** O.1 / **O.2** / **O.3** O.4 / O.5 / **O.6** **O.7** / O.8 / **O.9** O.10	**Threats** T.1 / T.2 / T.3 T.4 / T.5 / **T.6** **T.7** / **T.8** / **T.9** T.10

Figure 4-2: SWOT analysis of Rila NP / Blagoevgradska Bistritsa Catchment Area (Study Area 2).

Chapter 5: Benchmark Analysis

5.1 Comparison of the two Study Areas

In Chapters 2 and 3, there was a detailed presentation of the status of nature and the anthropogenic activities that take place within the boundaries of both study areas. A more comprehensive and comparative presentation of the main elements for both areas, follows on Table 5-1.

Table 5-1: Comparison of the two study areas

	Study area 1 (Greece)	**Study area 2 (Bulgaria)**
Area (in hectares)	93.000	52.600
Number of Settlements	43 villages	25 villages, 1 city
Fauna	40 species of mammals	48 species of mammals
	277 species of birds	2934 species of invertebrates
	92 species of fish	99 species of birds
	22 species of reptiles	20 species of reptiles
	11 species of amphibians	5 species of fish
Flora	-	1400 species of vascular plants
		282 species of mosses
		130 species of freshwater algae
Zone categorization	3 zones categorization	2 zone categorization

One major difference that draws the attention is the zone cetogorization of the two study areas. NP-EMATH, as seen on Chapter 1, is organized in three major zones and several sub-zones, ranging from zones of absolute protection (A) to zones where anthropogenic activities of mild and/or medium intensity are permitted and coexist (C). In general, it is not common for intense anthropogenic activities to take place within the boundaries of a National Protected Park, but NP-EMATH happens to be one of the few exceptions. On the contrary, National Park Rila, in the study area 2, with the exception of tourist activities, is completely sheltered from human impacts. The anthropogenic activities identified is study area two, are resulting from the integration of the Bistritza river catchment area, thus the two zone categorization is necessary.

By further analyzing Table 5-1, it becomes evident that both of the study areas are characterized by the rich fauna of flora population. Both areas shelter numerous species, hinting the importance they both have on the natural ecosystem of each country.

One significant characteristic that both study areas present is the proximity to city centers. Study area one in Greece, within a few kilometers distance, is surrounded by three cities (Kavala, Xanthi, Komotini), capitals of their respective regional unit. On the other hand, Study area two in Bulgaria, besides covering a respectful amount of the city of Blagoevgrad, is also in close proximity with the capital of Bulgaria, Sofia, since National Park Rila occupies part of the Sofia province. This fact draws

the conclusion that both study areas are easily accessible by tourists and people who want to admire the natural landscape. This proximity with city centers though, means that there should be extra attention in order for the areas to remain unaffected from intense anthropogenic activities.

5.2 Comparison with other National Parks in Bulgaria and worldwide

Comparison of National and Nature Parks in Bulgaria

The matters related to protected areas in Bulgaria are settled in the Protected Areas Act. It defines the categories of protected areas, their purpose and regime of use and management. The Law aims at the preservation of protected areas as a national and global treasure and as a special form of keeping nature, supporting science and culture development and the welfare of society as a whole. Table 5-2 shows the specific characteristics of National and Nature Parks in Bulgaria.

Table 5-2: Description of the National and Nature Parks in Bulgaria.

Category of PA	Name	Designation	Area	Purpose of designation	Other PAs included
National park	Rila	24.02.1992	81046ha	Preserve, forever and in the favour of society, complexes of self-regulating ecosystems and their species diversity, habitats of rare and endangered species and communities, typical and remarkable landscapes and objects of non-living nature which are of global importance to science and culture.	4 nature reserves, 2 protected sites under NATURA 2000, both Directives
National park	Pirin	08.11.1962	40356 ha	Preserve the natural state f natural ecosystems and landscapes together with their plant and animal communities and habitats.	2 nature reserves, 2 protected sites under NATURA 2000, both Directives
National park	Central Balkan	31.10.1991	72021 ha	Preserve, forever and in the favour of society, complexes of self-regulating ecosystems and their species diversity, habitats of rare and endangered species and communities, typical and remarkable landscapes and objects of non-living nature which are of global importance	9 nature reserves, 2 protected sites under NATURA 2000, both Directives

				to science and culture.	
Nature park	Rila Monastery	24.02.1992	27370 ha	Maintain diversity of ecosystems and protect biological diversity inside them	1 nature reserve, 2 protected sites under NATURA 2000, Birds Directive, 2 protected sites under Habitats Directive
Nature park	Vitosha	27.10.1934	27079.11 ha	Define forests and pastures of Vitosha Mountain as a strictly guarded perimeter and a nature park with included reserves	2 nature reserves, 1 nature landmark, 2 protected sites under NATURA 2000, both Directives
Nature park	Bulgarka	09.08.2002	21772.16 ha	Protect, restore and maintain beech ecosystems and landscapes in the Gabrovo and Tryavna sections of Central Stara Planina	3 protected localities, 2 nature landmarks, 2 protected sites under NATURA 2000, both Directives
Nature park	Zlatni Pyasatsi	03.02.1943	1324.7 ha	Preserve plant and animal communities and typical earth formations and landscapes which have scientific and cultural value and significance	1 protected locality, 1 protected site under NATURA 2000, Birds Directive
Nature park	Vrachantski Balkan	21.12.1989	30129.9 ha	Act as a People's Park (old classification of PAs in Bulgaria)	4 protected localities, 5 nature landmarks, 1 protected site under NATURA 2000, Birds Directive
Nature park	Shumensko Plato	05.02.1980	3930.7 ha	Preserve valuable plant and animal communities and the big diversity and beauty of the places suitable for recreation and tourism	1 nature reserve
Nature park	Persina	04.12.2000	21762.2 ha	1. Protect, restore and maintain the diversity of local ecosystems and landscapes, local species of wild plants and animals, as well as local breeds and sorts. 2. Restore flood forests and wetlands in the Svishtov-Belene Plain and nearby Danube islands.	4 protected localities, 2 nature reserves, 1 maintained reserve, 4 protected sites under NATURA 2000, Birds Directive

Nature park	Belasitsa	28.12.2007	11732.43 ha	1. Preserve centuries-old forests of European beech (Fagus sylvatica L.) and sweet chestnut (Castanea sativa Mill.), as well as natural plane tree habitats; 2. Preserve protected and endemic plant species such as Taxus baccata L., Ilex aquifolium L., Acer heldreichii Orph. ex Boiss., Medicago carstiensis Jacq. ssp. belassitzae Koz., and Lilium albanicum Grsb.; 3. Preserve protected and endemic species of animals such as Dendrocopos leucotos lilfordi Bechstein, Dryocopos martius L. and others	1 nature reserve, 2 protected sites under NATURA 2000, Habitats Directive
Nature park	Rusenski Lom	26.02.1970	34080 decares	Protect biological and landscape diversity and cultural and historical heritage	1 protected site under NATURA 2000, Birds Directive
Nature park	Sinite Kamani	28.11.1980	11380.8 ha	Protect rare, endangered and disappearing species of flora and fauna, as well as their habitats	4 nature landmarks, 1 nature reserve, 2 protected sites under NATURA 2000, both Directives
Nature park	Strandja	24.01.1995	116 136.2 ha	Protect, in the long term, the unique nature of the catchment areas of the rivers of Veleka and Rezovska, and secure sustainable social and economic development of the region	5 nature reserves, 16 protected localities and 7 nature landmarks, 2 protected sites under NATURA 2000 – one under Birds Directive, one under Habitats Directive

The project territory covers one of the three national parks of Bulgaria, so the zoning of protected areas which defines the allowed and banned activities inside has been shown only for the national parks – see Table 5-3. The different zones of the national parks have different regimes of management (table 5-4).

Table 5-3: Zoning of the three national parks in Bulgaria.

Protected area	Zones as per the Protected Areas Act, Art. 19 (p.1, p.2, p.3)			Zones as per the Protected Areas Act, Art. 19, p.4 (other zones related to conditions in the parks)		
Rila NP	Reserves Zone	Tourism Zone	Infrastructure Zone	Limited Human Impact Zone	Multi-Functional Zone	-
Pirin NP	Reserves Zone	Tourism Zone	Buildings and Facilities Zone	Limited Human Impact Zone	Forest Ecosystems Protection and Recreation Zone	Sustainable Use of Open Areas Zone
Central Balkan NP	Reserves Zone	Nature-Friendly Tourism Zone	Infrastructure Zone	Limited Human Impact Zone	Multi-Functional Zone	-

Table 5-4: Allowed (A) and forbidden (F) activities in the different zones of national parks

Type of activity	Reserves and maintained reserves zone	Tourist zone	Zone of huts, administrative centers for management and maintenance of parks and sports facilities	Limited human impact zone
Scientific research	A	A	A	A
Visits with educational purpose	A	A	A	A
Hiking and recreation	F	A	A	F
Collection of herbs, mushrooms, and wild fruits for personal use	F	A	A	F
Maintenance and restoration activities	F	A	A	F
Regulation of animal species numbers	F	A	A	F

Grazing	F	A	A	F
Sports	F	A	A	F
Construction, repairs and reconstruction	F	F	A	F
Rescue actions	A	A	A	A
Jumping and swimming in water bodies	F	F	F	F
Skiing outside the marked ski-tracks	F	F	F	F
Artificial lighting of terrains	F	F	A	F
Washing and bathing in rivers and lakes using soap and washing substances	F	F	F	F
Night grazing and grazing without shepherds	F	F	F	F
Shooting movies and documentaries, and creating other artistic material without the permission of the Park Directorate	F	F	F	F
Placing any signs or labels without the permission of the Park Directorate	F	F	F	F
Water catchment for drinking purposes	F	A	A	A
Use of artificial fertilizers and other chemicals	F	F	F	F
Use of boats and other sailing carriers in the lakes, except for scientific research, monitoring, maintenance and restorations activities; with the permission of the Park Directorate	F	F	F	F

Comparison of National Parks Worldwide

Ten indicative National Parks on a global and European level were selected to be presented. All of them were members or candidate members or parks expressing interest to the PAN Parks International Network where Rila NP was a member too.

OULANKA NATIONAL PARK, FINLAND

Oulanka National Park was established in 1956 and was expanded in 1982 and 1989. It covers 290 km². It is a combination of northern, southern and eastern features of nature. The landscape includes pine forests, river valleys with sandy banks and rapids, and vast mires to the north. It has a unique river ecosystem and is an example of untouched boreal forest, which is protected by World Wide Fund for Nature. The area is rich in animal and plant species, even endangered ones. Today, the majority of Oulanka's 200,000 annual visitors come during summer. The main tourist season starts in the end of June and lasts to the end of August.

FULUFJÄLLET NATIONAL PARK, SWEDEN

Fulufjället National Park was designated in 2002. It covers 385 km², over 60% of which are bare mountain heights and heath. There are 395 different species of moss and 421 different species of lichen. Animal world includes elk, bear, wolverine, wolf and lynx, plus some smaller predators such as pine marten, ermine, lemming and fox. Its pride is the Njupeskär waterfall – the highest in Sweden with a total of 93 m, located in a deep canyon. Most of the visitors come for the waterfall. The park receives 53 000 visitors a year.

PAANAJÄRVI NATIONAL PARK, RUSSIA

Paanajarvi National Park was established on 20 May 1992 by Decree of the Government of the Russian Federation as a specially protected nature area of Federal importance. Its total area is 1044.73 km². The main purpose of establishing Paanajarvi National Park was to preserve the unique nature complexes of lake Paanajarvi and Olanga river and to use them in nature protection, recreation, educational and research activities. Development of tourism in the National Park is based on building awareness of the necessity of nature conservation. The Park receives approximately 6 000 visitors a year.

RETEZAT NATIONAL PARK, ROMANIA

Retazat is the oldest Romanian national park (1935) located in the Retezat Mountains. The area hosts one of Europe's last remaining intact old-growth-forest and the continent's largest single area of pristine mixed forest. In 1979 the Man and Biosphere Program of UNESCO included the park in the international network of biosphere reserves but only in 1999 a National Park Directorate was established. Currently the park has an area of 380.47 km^2. Remoteness helped Retezat to preserve its natural values, at the same time making access difficult and distances - long. With approximately 35.000 visitors per year, the Retezat National Park is still only vaguely popular among nature lovers and hikers.

MAJELLA NATIONAL PARK, ITALY

Majella National Park was established in 1991 and covers an area of 740.95 km^2. The park is centered on the Majella massif, whose highest peak is Monte Amaro (2,793 m). Due to the altitude, inaccessibility and prominence, Apennine wildlife can be seen here in all its greatness such as the Apennine wolf which is also present in the park's logo. One third of all Italian flora with Pyrenean, Arctic, Illyrian, Balkan, Alpine and Mediterranean elements can be found here. The high summits and the grasslands of the mountains remain covered with snow during the winter months. The park receives approximately 530,000 visitors a year.

BORJOMI - KHARAGAULI NATIONAL PARK, GEORGIA

Borjomi-Kharagauli National Park is located in the eastern part of lesser Caucasus Mountains. This is the first National Park in the Caucasus region designated according to international standards. It was established in 1995 with the support of WWF and German government in order to preserve the region's extraordinary nature, especially its virgin forests. The total area amounts to 851 km^2 and includes 4 various types of protected areas – Borjomi Nature Reserve, Borjomi-Kharagauli National Park, Nedzvi Managed Reserve and Goderdzi fossil forest Natural Monument. Visitors come for the exclusive variety of flowers, magnificent views and impressive forests which can be reached via the network of 11 trails.

HOHE TAUERN NATIONAL PARK, AUSTRIA

The Hohe Tauern National Park was established in 1981 and is therefore Austria's first National Park. During the following years it developed into the largest nature reserve in the Alps and Central Europe, with an area of over 1,856 km^2. The animal and plant world of the Hohe Tauern NP is representative of all high areas in the Alps and is characterized by its great variety of species and habitats. More than one-third of all verified Austrian plant species occur in the Hohe Tauern National Park, and some 50% of all mammals, birds, reptiles and amphibians. One can explore ancient Alpine landscapes such as glaciers, rock walls, grasslands and cultural and pastoral landscapes. The park receives 1,350,210 visitors a year.

PEAK DISTRICT NATIONAL PARK, ENGLAND

The Peak District National Park was established in 1951 and covers an area of about 1,440 km^2. The purpose of the Peak District National Park Authority is to preserve and promote the natural beauty, wildlife and cultural heritage of the Peak District, as well as to secure opportunities for the understanding and enjoyment of the Peak District's special qualities. The wildlife of the park is remarkable, from the limestone White Peak with its flower-rich dales to the gritstone Dark Peak with its globally important peat bogs and birdlife, and the South West Peak with its delicate mosaic of habitats. The Peak District receives over ten million visitors annually.

KURE MOUNTAINS NATIONAL PARK, TURKEY

Kure Mountains National Park is a plateau on the Küre Mountains, on the west of Black Sea Region. It was designated in 2000 and covers about 377.53 km². The national park protects intact forests, wildlife, endemic plant species, caves, canyons, waterfalls, geologic features, traditional life and architecture. There are nearly 100 caves in the region, whose exact location is mapped. The park is managed based on the participatory approach, with the nearly 200 villages from the adjacent territories. It receives approximately 10,000 visitors a year.

To make a comparison between these parks, we have used parameters such as the annual volume of visitors, the total area of coverage and the main problem faced by each management of the protected areas (see Table 5-5).

Table 5-5: Comparison of National Parks based on area of coverage and visitors per year (international)

NAME	COUNTRY	MAIN PROBLEM	VISITORS PER YEAR	AREA COVERAGE
Hohe Tauern	**Austria**	Global climate change; Daily visitor management	1,350,210[5]	1,856 km^2
Oulanka	**Finland**	Intensive reindeer herding	more than 200,000[6]	290 km²
Fulufjället	**Sweden**	Need to re-distribute tourist flow	53,000[7]	385 km²
Peak District	**England**	Serious erosion problems, particularly on the fragile peat moorlands	Over 10 million[8]	1,440 km^2
Paanajärvi	**Russia**	The most common types of violations of the regimes are fishing in prohibited areas and staying in a protected area without authorization	6,000[9]	1,044.730km²
Retezat	**Romania**	Still only modestly popular with nature lovers and hikers	35,000[10]	380.47 km^2
Majella	**Italy**	A conflict arises between traditional activities and wildlife repopulation	530,000[11]	740.95 m^2
Borjomi-Kharagauli	**Georgia**	Systems for visitor management	59,458[12]	851 km²
Kure Mountains	**Turkey**	Land use planning	10,000[13]	377 km²
Rila	**Bulgaria**		87,721[14]	810.46 km²

[5] https://www.nationalpark.at/en/the-national-park/the-national-park-concept/
[6] http://www.nationalparks.fi/oulankanp/history
[7] https://www.sverigesnationalparker.se/en/choose-park---list/fulufjallet-national-park/
[8] http://www.peakdistrict.gov.uk/learning-about/about-the-national-park
[9] http://eng.paanajarvi-park.com/
[10] http://www.retezat.ro/index.php/english/about-the-park.html
[11] https://www.lifeinitaly.com/tourism/abruzzo/majella-park?page=9
[12] http://apa.gov.ge/en/protected-areas/cattestone/bordjom-xaragaulis-erovnuli-parkis-administracia
[13] http://www.goturkeytourism.com/things-to-do/kure-mountains-national-park-kastamonu-turkey.html
[14] Data provided by Rila NP Directorate

5.3 Comparison with other National Parks in Greece and worldwide

Comparison of National Parks in Greece

According to the Ministry of Production and Reconstruction of the Environment and Energy, there are twenty (20) regions in Greece that have been designated as protected by Law 3937/2011. In addition, the designation and delimitation of the permitted land uses and activities of the area have been instituted by the adoption of a Presidential Decree or a Joint Ministerial Decision.

The purpose of the legislation is to protect, conserve, manage and upgrade nature and landscape as a natural heritage and a valuable natural resource, and the rare habitats and species of flora and fauna occurring in these areas. Protected areas of Greece are distinguished for their great biological, ecological, aesthetic, scientific, geomorphological and pedagogical value. Table 5-6 shows the specific characteristics of Greece's protected areas.

Table 5-6: Description of the National Parks and Protected Areas in Greece.

	Name	Description
1	National Park Schinia-Marathona	• Including the terrestrial and aquatic areas of Schinias-Marathonas, covering 13.820 acres (EKBY, 2018), located in the outlying area of the municipality of Marathonas. • The target is the effective protection of Schinias wetland, the pine forests, the Makaria springs, the peninsual of Cynosyra, the Drakonera hill and the marine area of the bay of Marathonas (OGG 395/03.07.2000).
2	National Park of wetlands of the Koronia valley and Macedonian temples	• Including the terrestrial, and aquatic areas of the wetlands of Volvi-Koronia and the Macedonian Temples, covering a total area of 163,880 acres (EKBY,2018). • Seeking to restore, improve, and to perpetuate protect (OGG 441/TAAPTH/09.10.2008): ➢ the internationally importance of the wetland ecosystem of the Koroneia-Volvia lakes ➢ the Richi River, as well as the "Specially Protected Mediterranean Area" and a high aesthetic value of the riverbed (Macedonian Tempi) ➢ the unique value of the lakeside scenery of Apollonia, which is a biotope of rare bird species. ➢ the preserved monuments of nature ➢ Habitats of protected bird species, and in particular, of migratory species. ➢ the endemic flora habitat.
3	National park of Northern Pindos	• Including the terrestrial area of the mountainous regions of Northern Pindos. • It seeks to establish procedures and measures to ensure the harmonious coexistence of man and nature in the context of sustainable development (OGG 639/D/05.03.2005).
4	Mesolonghi-Aitolikos National Park	• Including the lagoon, land, river areas of the southern part of the Prefecture of Aitoloakarnania and the island complex of the Northern and

		Southern Echinades of the Prefecture of Kefallinia, totaling 250,000 acres (EKBY, 2018). • The avifauna of the area is one of Europe's richest wetlands, both in number of species and in population (OGG 477/D/31.05.2006).
5	National Park of Kerkini Lake	• Ensuring the harmonious coexistence of the natural and man-made environment, the preservation of the natural heritage and the sustainable and balanced development of the region. • Seeking to protect and conserve the biotopes of protected bird species, in particular migratory species, buffalo populations and endemic flora (OGG/98/TAAPTH/08.09.2006).
6	National Park of Dadias-Lefkimi-Soufli forest	• It includes the forest complex of Dadia - Lefkimmi - Soufli with a total area of 428,000 sq (EKBY, 2018). • It seeks to develop activities to preserve the traditional uses of natural resources and sustainable ecotourism, environmental education and recreation (OGG 911/D/13.10.2006).
7	Evros Delta National Wetland Park	• Including the terrestrial and aquatic parts of the Delta wetland area at the mouth of the river Evros and its wider region. • Its Bird-fauna is one of Europe's richest wetlands, both in number of species and population (OGG 102/D/16.03.2007).
8	Amvrakikos Nationtal Wetland Park	• Including the terrestrial and aquatic parts of the Amvrakikos Gulf (OGG 123/D/21.03.2008).
9	National Park of Eastern Macedonia and Thrace	• Including the land and water sections of a total area of 726,775.03 of the Nestos Delta wetlands, Lake Vistonida, with lagoon and lake features of Lake Ismarida and their wider region. • Effective protection of the unique for the multi-faceted value of habitat types and the rare species of flora and fauna that are endemic and reproductive in the area (OGG 497/D/17.10.2008).
10	National Park of Rodopi Mountaints	• Including the aquatic and terrestrial regions of a total area of 1,731,150 acres of the Rhodope Mountains, as well as the archaeological, historical, cultural and aesthetic elements of the wider region. • The aim is to: a) protect and conserve the large number of important species of wildlife and their habitats, and biodiversity and the natural processes that govern the ecosystems of the area. b) The protection, preservation and promotion of the archaeological and historical monuments of the area, the rich tradition and local customs, the special features of the landscape. (c) Enhancing and promoting sustainable local development through the rational use of natural resources, traditional occupations and activities and mild forms of tourism. d) Educating and raising public awareness of ways and methods of harmonious coexistence of human activities and natural processes (OGG 445/D/02.10.2009).
11	Axios-Loudias-Aliakmonas delta National Park	• Including the terrestrial and aquatic areas, totaling 338,000 acres, the estuaries of the Gallikos, Axios, Loudias and Aliakmonas rivers, the Ketros salt mine, the Kalohori lagoon and the wider region • The avifauna of the area is composed of several important species (OGG 220/TAAPTH/14.05.2009).

12	Prespes National Park	• It includes the Greek part of the land and lake area of the complex of the small and large Prespa lakes, totaling 327,000 acres (EKBY, 2018). •The characteristics that make up the area's values are: a) The beauty of the landscape. b) Rare ecosystems / habitats - habitats. c) The total biodiversity (genetic material, plant and animal populations, biotopes and their functions), with particular emphasis on the local breed of the Prespa cow, the local varieties of cultivated plants, rare and endemic plants and animals (mainly fish species), rare species of habitats. (d) The whole of the natural - cultural landscape, and in particular all the natural and cultural parameters which allow the region to preserve its specific character (OGG 302/23.07/2009).
13	Tzoumerka- Peristeri and Arachthos Gorge National Park	• It includes parts of the Tzoumerka mountain range, Peristeri, the Arachthos River gorge and the intermediate area. • It seeks to establish procedures and measures to ensure the harmonious coexistence of man and nature in the context of sustainable development (OGG 49/D/12.02.2009).
14	Kotychi - Strofylia Wetland National Park	• Includes terrestrial, aquatic and marine sections of the Kotychi Lagoon and the Strofialia Forest, totaling 143,000 acres. The park is a rich wetland with many marshes, artificial canals, rivers, lagoons, dunes and dunes. In the park there are many species of amphibians, reptiles, rodents, turtles, foxes and other species of birds (OGG 159/D/29.04.2009).
15	National Marine Park of Alonissos - Northern Sporades	• It includes the land and sea areas of Northern Sporades with a total area of 2.087.130 acres (EKBY, 2018). • Effective protection is sought for the unique multi-faceted value of the Northern Sporades ecosystem, where, besides the existence of rare species of flora, fauna, habitats, natural formations and formations, the world's largest population of the Monk Seal lives and reproduces the species that has been described as the number one endangered marine mammal (OGG 621/D/19.06.2003).
16	Helmos - Vouraikos National Park	• It includes the terrestrial area of the Helmos mountain range and the Vouraikos river gorge. • It seeks to conserve and manage the rare habitats and species of flora and fauna that occur in the area OGG 1272/D/27/11/2003).
17	National Marine Park of Zakynthos	• Including the marine and coastal area and the islets of Lagana Bay and Strofa Islands, Zakynthos Prefecture, with a total area of 132,000 acres (EKBY,2018). • It seeks to protect and conserve the most important spawning beaches of the sea turtle Carettacaretta and the Monachous monachous monachous seal and the Monachous monk seal population (OGG 906/A/22.12.1999).
18	Wetlands and coast Psalidiou of the Municipality of Kos	• Including the terrestrial, marine and aquatic parts of the wetland area and the Psalidi coast of the municipality of Kos (OGG 571/D/6.7.2006).
19	Nature Conservation Area of Kastoria Lake	• Including the terrestrial and aquatic environment of the Kastoria lake area. • It is intended to conserve existing bird species and to protect rare and

		threatened species nesting in the area of Kastoria Lake (OGG 226/TAAPTH/19.06/2012).
20	Protected Area of Estuary and Strait of the Acheron, Kalamas and Elos Kalodikion rivers	• Including the land, water and sea areas of the rivers Acherontas and Kalamas, Elos Kalodniki and their wider area, with a total area of 155,432 acres. • It is intended to protect and conserve rare habitats and species of flora and fauna and, in particular, the avifauna composed of several species endemic and reproducible in the area, which is included in Special Protection Areas (SPAs) and Areas of Areas of Community Interest (SCI) European Natura 2000 Ecological Network (OGG 396/D/17.09.2009).

The legislation defines four protection zones for each National Park, which is described as follows:

- Zone A includes the areas of Absolute Nature Conservation,
- Zone B represents the areas of Nature Conservation, Natural Formations and Landscape Elements,
- Zone C concerns the areas of eco-development and farming, and
- Zone D is the Regional Zone (only where it exists).

In most protected areas of Greece, primary activities such as agriculture, livestock, fisheries, aquaculture, aquaculture, apiculture, forestry and salt production are permitted, even in areas of Absolute Nature Conservation. Scientific research, management actions and the execution of projects aiming at improving, preserving or restoring ecosystem features, as well as visiting for environmental education, nature observation and recreation are activities carried out in Zone A of almost all protected areas of Greece.

On the contrary, the installation of high-nuisance industries is banned in all areas of the National Parks, except for the Regional Zone of the Tzoumerka-Peristeri National Park and the Arachthos Gorge. Permissible land uses per zone per National Park are shown in Table 5-7.

The provisions of the legislation applicable to the permitted activities in Zone A are mostly applicable to the other areas of the protected area (e.g. if agriculture is allowed in Zone A then it is also allowed in Zones B, C and D, if available.).

Table 5-7: Permissible land use per zone per protected area.

Type of activity	S/N of National Park																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Scientific research and corresponding facilities of light infrastructure	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	A	A
Management actions and implementation of projects aimed at improving, maintaining or restoring the ecosystem characteristics	A	A	A	A	B		A	A	A	A	A	A	A		A	A	A	A	A	A
Visit for the purpose of environmental education, nature observation, recreation, sea baths and river crossings with floating craft type kayak and rafting	B	A	A	B	A	A	A	A	A	B	A	B	A			A	A	A	A	A
Grazing		A	A	B	B	A	A	A	A	C	A	B	A	A	A	A	B	D	A	A
Professional and / or amateur fishing		A	A	B	B	A	A	A	A	C	A	B	A	A	A	B	A	A	B	A
Fish-farming		A			B		A	A	A		A			A		B				A
Maintenance and modernization of existing networks and infrastructures		A	A	B	B	A		A	A	B	A	B	A	A	B	A	A	D	A	A
Crafting and moving small boats and maintenance, installation of related traditional infrastructure				B	B		A		A		A	B	A		A		A		B	A
Maintenance, repair and restoration of historical, religious and cultural monuments and sites - excavations		A	A	A					A	A	A	C	A		A		A		B	A
Apiculture		A	A	B	B	A	B			C	A		A			A	B		A	A
Alternative Tourism				B		A		B	A	C	A							D		A
Rehabilitation and improvement of fish stocks		A		B			A	A	A		A		C						A	D
Enrichment of wild and non-fauna and wild flora					B	A			A	C	A									A
Vehicle traffic on the existing road network		A	A		B	A	A				A	B				B		D		
Installations for the production of electricity and heat from RES			A		C2	B	A		A		A		C						B	A
Collection of benthic organisms				B							B									
Extraction of sediment (sand)		A		B	B	A		A	A		B	C							D	A

Table 5-7: Permissible land use per zone per protected area.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Clearing slopes of drainage ditches				B			A	A	A		B								D	
Projects to prevent or deal with groundwater salinisation									A		B									A
Free use of beaches and organized beaches (non-permanent constructions)	B			B					A		B	B	A		A		A			D
Conservation of legally existing buildings			A		B			A	A		B		A						A	A
Change of land use for environmental activities aiming at upgrading and strengthening the elements of fauna and flora						A			A		B									
Maintenance and repair of the lighthouse											B				A			D		
Salt production									A		B									
Agriculture and horticulture (legally existing crops)	C1	A	A	B	B	A	A	A	A	C	C1-2	B	A	A	A	A	A	D	A	A
Embankment sites and infrastructure					C2	B	A		B	C	C1-2	B		A	A	C	C		D	D
Improvement, restoration and modernization of existing agricultural warehouses	C1	B				B	C	B	B		C1-2	C		A		C	B		D	A
Residence	B	B	A	B	C2	B			B	C	C1-2	C	B	A	B	C	B	D	D	A
Poultry farming units		B	A		C2	B			C		C1-2		C			C				D
Aquaculture		B		B	C2		A	B	A		B			A						A
Hunting		B	A		C2	B	A	B	B	B	C1-2	B	B	B		C			D	D
Low coverage greenhouses	B	B							C		C1-2			A			C		D	
Shipbuilding									B		C1-2									D
Hotel / Tourist facilities			A		C2	B			B	C	C1-2	C	C	A		C	C			D
Low-nuisance production activities		B	A			B		B	B	C	C1-2	C	C	B						D
Sport facilities	B	A		B	C2				B		C1-2	C		A		C	C		B	D
Operation of legal irrigation and water systems (networks and drilling, water drainage, river flow rehabilitation, construction of irrigation dam)	A	A	A	B	C2	B	A	A	A	C		C		A	A	A	B		D	A

Table 5-7: Permissible land use per zone per protected area.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Reforestation and fire protection works	A					B											A		A	
Erection of facilities for environmental education, information and research (signs, outposts, scientific equipment, environmental centers, etc.)	B	A	A	B	B		A		B				A	A	B		A	D	A	D
Flood defense projects	B		A		B				A			B		A					A	
Forestry, forest management		A	A	B	B	A			A	B			A	A		A	A			A
Construction and use of building auxiliary facilities (WC, changing rooms)	B	B	A	B							B	C					A			
Waste treatment and associated projects (waste water treatment pipelines etc.)		B			C2	A			B										D	D
Establishment, installation, operation and maintenance of new and existing light manufacturing and craft industries					C2				Γ		C1-2	C	C	B		C	C			
Camping and outdoor activities			A		C2				B			C	B	A						A
Quarries for the extraction of traditional quarry products			A		C2							B	C						D	
Installation and operation of Sanitary Landfills for Waste and other sites for the disposal and treatment of refuse and aggregates			A						C				D							
Construction and operation of mountain shelters and paths			A	B									B			A				D
Construction of buildings for various purposes (hospitals, offices, shops, supermarkets, restaurants, refreshments etc.)									C	C			C	A		C	C		D	
Vehicle refueling stations									C			C					C			
Maintenance and modernization of the airport zone									C											
High Impact Industry - Industrial Areas													D							

Comparison of National Parks Worldwide

According to the International Union for Conservation of Nature (IUCN), there are 113,000 National Parks around the world, covering about 6% of the Earth's surface. In Europe, there are 359 National Parks. Following, ten indicative National Parks on a global and European level (selection based on ease of traceability on the Internet) are presented. Particular emphasis is placed on the importance, size, geomorphology of the area, rare species of flora and fauna, wildlife coexistence with anthropogenic activities and management problems faced by individual park management bodies.

Yosemite National Park (California, USA)

Yosemite has been declared a Cultural Heritage Monument and is internationally recognized for its natural beauty, impressive granite hills, waterfalls, rivers and streams, as well as its biodiversity. In addition, about 89% of the area is classified as a wildlife area. The park receives over 3.5 million visitors a year. One of the challenges faced by the park's management body is the preservation and protection of the natural elements of the area alongside the provision of valuable leisure services (Yosemite Park, 2018).

Yellowstone National Park (Wyoming, USA)

Yellowstone is the first (1872) declared national park in the world. It is a natural refuge for wildlife such as wolves, bears, deer and bison. Guests can enjoy attractions such as gorges, thermal spas and unique water formations, as well as a range of activities (eg hiking, rowing, cycling, etc.) (Yellostone Park, 2018). Waste and waste disposal, illegal introduction of non-endemic species (trout), road construction and the high number of visitors are some of the anthropogenic activities that affect the harmonious coexistence of wildlife and man (Encyclopedia of Earth, 2018a).

Teide National Park, Tenerife, Canary Islands

Teide National Park is included in the UNESCO World Heritage List since 2007. The main attraction is the 48-meter crater of the Teide Pico-Viejo volcano, surrounded by lunar scenery. Drought makes the survival of wild animals difficult, with only 30 species of vertebrates and 10 bird species living in the area. The park visits about 3.5 million tourists a year. The two main threats to the park are the invasion of exotic species and tourism. Thirty (30) plant species have disappeared due to human waste and overgrazing (Encyclopedia of Earth, 2018b).

Dartmoor National Park, United Kindgom

Dartmoor is one of the smallest National Parks in the UK, and is a haven for about 3,000 free pony. The park includes 23 conservation points with swamps, ancient forests and rare fauna such as moles and many bird species31. The park manager usually faces problems in handling the large volume of visitors (2.7 million) and vehicles (40% of tourists use the car to approach the area) (Dartmoor National Park, 2018).

Loch Lomond- Trossachs National Park, Scotland

Loch Lomond-Trossachs National Park includes mountainous volcanos, lakes, lakes and rivers. Agriculture is the main land use within the park, while water bodies are sources of renewable energy. The park is a short distance from crowded cities and receives a large volume of visitors a year at Loch Lomond and Trossachs (Scottish Parliament, 2018).

Cévennes National Park, France

The Cévennes National Park is located above the Languedoc-Roussillon Plains. Mountain Lozere is the highest point (1,699 meters) in the park. At the edge of the park live 2,410 species of birds, mammals, insects and reptiles, such as beavers and blackheads. The main activity of the wider region is tourism.

Swiss National Park, Switzerland

The park includes mountain ranges, forests and valleys, and is a haven for bird species such as gypsy and golden eagle, as well as mammals such as guinea pig, marmot and rare Alpine chamois. Within the park, hiking is permitted on existing trails of a total length of 80 km. The biggest threat to the park is increased traffic on the motorway crossing the park (800,000 vehicles per year) (Engels and Hesse, 2004).

Sarek National Park, Sweden

The Sarek National Park in northwest Sweden is one of Europe's last wildlife areas and hosts 100 glaciers and six mountain peaks, including Sweden's second tallest mountain, Sarektjåkkå. Deer, lynx, brown bears and golden eagles find shelter in Sarek. The park does not have tourist facilities (Swedish Environmental Protection Agency, 2018).

The annual volume of visitors, the total area of coverage and the main problem faced by each management of the protected areas, are parameters facilitating the comparison of the National Parks, and are summarized in the Table 5-8.

Table 5-8: Comparison of National Parks based on area of coverage and visitors per year (worldwide)

Name	Country	Main Problem	Visitors per year	Area coverage (acres)
Yosemite	USA	Daily guest management	3.500.000	3.108.000
Yellowstone	USA	Reduction of endemic species/pollution	3.500.000	8.983.000
Teide	Spain	Daily guest management	3.500.000	189.900
Dartmoor	England	Daily guest management	2.300.000	953.000
Saxony Switzerland	Germany	Daily guest management	2.150.000	93.500
Loch Lomond & Trossachs	Scotland	Daily guest management	1.750.000	1.865.000
Cèvennes	France	Development of sustainable tourism	1.000.000	3.210.000
Swiss	Switzerlalnd	Increased vehicle traffic	150.000	172.300
Sarek	Sweden	Bird species nuisance from canoe activities	128.000	1.977.000
NP-EMATH	Greece		6.700	726.775

Chapter 6: Conclusions

During this study, a vast amount of information was collected producing knowledge regarding the anthropogenic activities and status of nature of the protected areas: 1) National Park of Eastern Macedonia and Thrace in Greece (NP-EMATH) (Study Area 1) and 2) Rila National Park of Bulgaria (RNPD) including the catchment area of the river basin of Blagoevgradska Bistrica (Study Area 2). The information presented in this study serves as the basis to identify and analyze the special characteristics and basic needs of the examined areas, thus facilitating the development of efficient decision support tools and monitoring systems. The areas under focus did not only included the areas of absolute protection but also neighboring areas where anthropogenic activity is intense. In this way, the results of the Project BIO2CARE benefit not only the protection of natural environment and biodiversity of the areas, but also local communities through the development and adoption of circular economy and green entrepreneurship strategies.

Both of the study areas are characterized by the rich fauna and flora population. Both areas shelter numerous species, hinting the importance they both have on the natural ecosystem of each country. One significant characteristic that both study areas present is the proximity to city centers. For Study area 1 in Greece, within a few kilometers distance, is surrounded by three cities (Kavala, Xanthi, Komotini), capitals of their respective regional unit. On the other hand, Study area 2 in Bulgaria, besides covering a respectful amount of the city of Blagoevgrad, is also in close proximity with the capital of Bulgaria, Sofia, since National Park Rila occupies part of the Sofia province. In that terms both study areas are easily accessible by tourists and people who want to admire the natural landscape. This proximity with city centers though, means that there should be extra attention in order for the areas to remain unaffected from intense anthropogenic activities.

The key conclusions resulting from the examination of the information presented in this study for the National Park of Eastern Macedonia and Thrace in Greece (NP-EMATH) (Study Area 1) are summarized below:

- The comparison of NP-EMATH with other National Parks worldwide demonstrates the need to develop an innovative way of approaching and analyzing the current situation of the area under study due to the variety of anthropogenic activities taking place within the National Park.

- The main problem faced by most of the National Parks management organizations worldwide is the increased annual volume of visitors (and their corresponding impact on the natural environment), which does not exist to a large extent in the case of NP-EMATH. The wider region approaches approximately 80,000 tourists each year, while only 8% of them visit the two Management Information Centers (2).

- The primary sector activities - agriculture, livestock farming and fishing / fish farming - which are allowed even in Zone A of NP-EMATH, account for more than 80% of the total area of the park.

- Manufacturing and craft industries located within the boundaries of the NP-EMATH (48.15%) are mostly active in the food and beverage industry.

- 43% of the total electricity consumed within the boundaries of NP-EMATH is generated by photovoltaic systems installed in either fields or roofs of homes (the percentage refers to the energy supplied to the grid and not necessarily to what is consumed within the National Park). In that aspect NP-EMATH presents a comparatively low carbon emission factor for electricity in comparison with the average value in Greece.

The key conclusions resulting from the examination of the information presented in this study for the Rila National Park of Bulgaria (RNPD) including the catchment area of the river basin of Blagoevgradska Bistrica (Study Area 2) are summarized below:

- The idea of PAN Parks Network of protected areas was to develop nature tourism of high standards. The comparison of Rila NP with other parks standing behind this idea shows that problems are quite different, as well as current numbers of visitors; plus, the number of visitors is not proportional to the size of the protected territory, nor is directly related to the level of economic development of the relevant country.

- Some problems quoted by the parks in that group are similar to those of Rila NP while others are quite different based on the specific features of the other PAs. For example, visitor management seems more like a common problem of all national parks than anything else, while intensive reindeer herding is very territory-specific.

- A main difference between all Bulgarian National Parks and many of the others worldwide is that the first are exclusive state property which pre-defines the types of anthropogenic pressure that are or rather aren't to be seen inside the park (e.g. settlements, household waste, etc.).

- Most human activities inside the park are related to the use of natural resources and tourism. The second needs better management tools, incl. maintenance of visitor infrastructure and re-distribution of tourist flows. Environmental education and awareness raising campaigns need more attention too.

Taking all of the above into account, BIO2CARE has identified food and energy production and consumption activities and tourism activities as priority points of the current study.

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ANNEX A

Species of flora in the catchment basin of Blagoevgradska Bistritsa River

No	Taxon (Latin name)	Red Data Book Republic of Bulgaria	Biological Diversity Act	Medicinal Plants	Parangalitsa Reserve	Rila National Park	Endemics /Relicts
	Mycetalia						
1	*Agaricus essettei*	EN				x	
2	*Amylocystis lapponicus*	EN			x	x	
3	*Antrodia heteromorpha*	EN			x	x	
4	*Hericium flagellum*	EN			x	x	
5	*Leucocortinarius bulbiger*	EN			x	x	
6	*Tremiscus helvelloides*	EN			x	x	
	Lichenophyta						
1	*Cetraria islandica*			x	x	x	
2	*Usnea barbata*				x	x	
	Equisetophyta						
	Equisetaceae						
1	*Equisetum arvense*			x		x	
2	*Equisetum palustre*			x		x	
3	*Equisetum ramosissimum*			x			
	Polypodiophyta						
	Aspidiaceae						
1	*Gymnocarpium dryopteris*					x	
2	*Polystichum lonchitis*					x	
	Aspleniaceae						
1	*Asplenium adianthum-nigrum*			x		x	
2	*Asplenium ruta-muraria*			x		x	
3	*Asplenium septentrionale*			x		x	
4	*Asplenium trichomanes*			x		x	
5	*Phyllitis scolopendrium*			x		x	
	Athyriaceae						
1	*Athyrium filix-femina*			x	x	x	
2	*Cystopteris fragilis*					x	
	Hypolepidaceae						
1	*Pteridium aquilinum*			x	x	x	
	Dryopteridaceae						

1	*Dryopteris filix-mas*			x	x	x	
	Polypodiaceae						
1	*Polypodium vulgare*			x		x	
	Pinophyta						
	Cupressaceae						
1	*Cupressus sempervirens*						
2	*Juniperus communis*			x		x	
3	*Juniperus oxycedrus*			x			
4	*Juniperus sibirica*			x	x	x	
	Pinaceae						
1	*Abies alba*			x	x	x	
2	*Cedrus atlantica*						
3	*Larix europaea*						
4	*Picea abies*			x	x	x	
5	*Pinus nigra*						
6	*Pinus mugo*				x	x	
7	*Pinus peuce*				x	x	Balkan/ Tertiary
8	*Pinus strobus*						
9	*Pinus sylvestris*			x	x	x	
10	*Pseudotsuga menziesii*					x	
	Magnoliophyta						
	Magnoliopsida						
	Aceraceae						
1	*Acer campestre*					x	
2	*Acer heldreichii* subsp. *visiani*	VU	Annex 3			x	Balkan
3	*Acer hyrcanum*						
4	*Acer negundo*						
5	*Acer platanoides*			x		x	
6	*Acer pseudoplatanus*					x	
7	*Acer tataricum*						
	Adoxaceae						
1	*Adoxa moschatellina*			x		x	
	Anacardiaceae						
1	*Cotinus coggygria*						
	Apiaceae						
1	*Aegopodium podagraria*					x	

2	*Aethusa cynapium*			x		x	
3	*Angelica pancicii*			x		x	
4	*Anthriscus cerefolium*			x		x	
5	*Anthriscus sylvestris*			x		x	
6	*Carum carvi*			x		x	
7	*Caucalis platycarpos*						
8	*Chaerophyllum aureum*					x	
9	*Chaerophyllum bulbosum*						
10	*Chaerophyllum hirsutum*					x	
11	*Chaerophyllum temulentum*						
12	*Heracleum verticillatum*			x	x	x	
13	*Laser trilobum*			x		x	
14	*Laserpitium latifolium*			x		x	
15	*Ligusticum mutellina*					x	
16	*Orlaya grandiflora*						
17	*Pastinaca hirsuta*					x	
18	*Pastinaca sativa*					x	
19	*Peucedanum aegopodioides*						
20	*Peucedanum arenarium*					x	
21	*Peucedanum carvifolium*					x	
22	*Peucedanum oligophyllum*					x	
23	*Pimpinella saxifraga*			x		x	
24	*Sanicula europaea*			x	x	x	
25	*Selinum carvifolia*					x	
26	*Seseli annuum*					x	
27	*Seseli libanotis*					x	
28	*Seseli rigidum*			x		x	
	Araliaceae						
1	*Hedera helix*			x		x	
	Aristolochiaceae						
1	*Aristolochia clematitis*						
2	*Aristolochia pallida*					x	
3	*Asarum europaeum*			x		x	
	Asclepiadaceae						
1	*Vincetoxicum fuscatum*						
2	*Vincetoxicum hirundinaria*			x		x	
	Asteraceae						

1	*Achillea clypeolata*					x	
2	*Achillea clusiana*					x	
3	*Achillea coarctata*						
4	*Achillea collina*						
5	*Achillea crithmifolia*						
6	*Achillea distans*					x	
7	*Achillea grandifolia*			x		x	
8	*Achillea lingulata*					x	
9	*Achillea millefolium*			x		x	
10	*Achillea multifida*					x	
11	*Achillea nobilis*						
12	*Achillea pannonica*					x	
13	*Achillea pseudopectinata*						
14	*Achillea setacea*						
15	*Adenostyles alliariae*					x	
16	*Antennaria dioica*			x		x	
17	*Anthemis arvensis*						
18	*Anthemis cretica*					x	
19	*Anthemis orbelica*	EN	Annex 3			x	Bulgarian
20	*Anthemis rumelica*	VU	Annex 3				Bulgarian
21	*Anthemis ruthenica*					x	
22	*Anthemis tenuiloba*					x	
23	*Arctium lappa*					x	
24	*Arctium minus*						
25	*Arctium nemorosum*			x		x	
26	*Arctium tomentosum*			x		x	
27	*Artemisia absinthium*			x		x	
28	*Artemisia annua*						
29	*Artemisia eriantha*	EN	Annex 3			x	Glacial
30	*Aster amellus*						
31	*Aster linosyris*						
32	*Bellis perennis*			x		x	
33	*Carduus acanthoides*			x		x	
34	*Carduus candicans*						
35	*Carduus nutans*					x	
36	*Carduus personata*					x	
37	*Carlina acanthifolia*			x		x	
38	*Carlina vulgaris*			x		x	

39	*Centaurea affinis*						
40	*Centaurea alba*						
41	*Centaurea biebersteinii*					x	
42	*Centaurea calcitrapa*						
43	*Centaurea cuneifolia*						
44	*Centaurea cyanus*			x		x	
45	*Centaurea diffusa*						
46	*Centaurea indurata*					x	
47	*Centaurea jacea*					x	
48	*Centaurea kotschyana*					x	
49	*Centaurea moesiaca*					x	
50	*Centaurea napulifera*					x	
51	*Centaurea nervosa*					x	
52	*Centaurea orbelica*					x	
53	*Centaurea pallidior*					x	
54	*Centaurea pannonica*			x		x	
55	*Centaurea phrygia*					x	
56	*Centaurea rocheliana*						
57	*Centaurea salonitana*						
58	*Centaurea scabiosa*					x	
59	*Centaurea solstitialis*						
60	*Centaurea stenolepis*						
61	*Cicerbita alpina*					x	
62	*Cicerbita plumieri*					x	
63	*Cichorium inthybus*			x		x	
64	*Cirsium appendiculatum*				x	x	Balkan
65	*Cirsium arvense*					x	
66	*Cirsium canum*					x	
67	*Cirsium creticum*						
68	*Cirsium heterotrichum*					x	
69	*Cirsium italicum*						
70	*Cirsium ligulare*					x	
71	*Cirsium vulgare*					x	
72	*Cota austriaca*					x	
73	*Cota tinctoria*					x	
74	*Crepis biennis*					x	
75	*Crepis foetida*						
76	*Crepis paludosa*					x	

77	*Crepis pulchra*						
78	*Crepis sancta*						
79	*Crepis setosa*						
80	*Crepis tectorum*						
81	Crupina vulgaris					x	
82	*Doronicum austriacum*				x	x	
83	*Doronicum columnae*			x		x	
84	*Echinops banaticus*					x	
85	*Echinops microcephallus*						
86	*Echinops sphaerocephalus*						
87	*Erigeron acris*					x	
88	*Erigeron alpinus*					x	
89	*Eupatorium cannabinum*					x	
90	*Filago arvensis*			x		x	
91	*Filago germanica*			x		x	
92	*Gnaphalium luteo-album*						
93	*Gnaphalium norvegicum*					x	
94	*Gnaphalium sylvaticum*					x	
95	*Hieracium alpicola*				x	x	
96	*Hieracium caespitosum*					x	
97	*Hieracium cymosum*					x	
98	*Hieracium echioides*					x	
99	*Hieracium halimifolium*					x	
100	*Hieracium hoppeanum*					x	
101	*Hieracium latifolium*						
102	*Hieracium pannosum*					x	
103	*Hieracium pilosella*			x		x	
104	*Hieracium pseudopilosella*					x	
105	*Hieracium racemosum*					x	
106	*Hieracium umbellatum*					x	
107	*Homogyne alpina*					x	
108	*Hypochaeris radicata*			x		x	
109	*Inula bifrons*						

110	*Inula conyza*					x	
111	*Inula germanica*			x			
112	*Inula hirta*					x	
113	*Inula oculus-christi*					x	
114	*Inula salicina*						
115	*Jacobaea abrotanifolia*					x	
116	*Jacobaea erucifolia*					x	
117	*Jacobaea pancicii*					x	Balkan
118	*Jacobaea vulgaris*			x		x	
119	*Jurinea consanguinea*					x	
120	*Lactuca quercina*					x	
121	*Lactuca serriola*						
122	*Lapsana communis*					x	
123	*Leontodon autumnalis*					x	
124	*Leontodon crispus*						
125	*Leontodon hispidus*					x	
126	*Leontodon rilaensis*					x	
127	*Leucanthemum vulgare*			x		x	
128	*Leucanthemella serotina*					x	
129	*Mycelis muralis*					x	
130	*Onopordum acanthium*			x		x	
131	*Petasites albus*			x		x	
132	*Petasites hybridus*			x	x	x	
133	*Picris hieracioides*					x	
134	*Prenanthes purpurea*					x	

135	*Ptilostemon afer*					x	
136	*Senecio doronicum*					x	
137	*Senecio nemorensis*			x	x	x	
138	*Senecio sylvaticus*				x	x	
139	*Senecio vernalis*						
140	*Senecio viscosus*			x		x	
141	*Senecio vulgaris*			x		x	
142	*Serratula tinctoria*					x	
143	*Solidago virga-aurea*			x		x	
144	*Tanacetum corymbosum*					x	
145	*Tanacetum macrophyllum*					x	
146	*Tanacetum parthenium*					x	
147	*Tanacetum vulgare*			x		x	
148	*Taraxacum bithinicum*	EN				x	
149	*Taraxacum officinale*			x		x	
150	*Taraxacum palustre*					x	
151	*Taraxacum serotinum*					x	
152	*Taraxacum vindobonense*					x	
153	*Telekia speciosa*			x		x	
154	*Tussilago farfara*			x	x	x	
	Balsaminaceae						
1	*Impatiens glandulifera*					x	
2	*Impatiens noli-tangere*					x	
	Betulaceae						
1	*Alnus glutinosa*					x	
2	*Alnus incana*						
3	*Alnus viridis*				x	x	
4	*Betula pendula*			x		x	

5	*Carpinus betulus*						
6	*Carpinus orientalis*						
7	*Corylus avellana*			x	x	x	
8	*Ostrya carpinifolia*						
	Boraginaceae						
1	*Anchusa azurea*						
2	*Anchusa barrelieri*						
3	*Anchusa hybrida*						
4	*Anchusa officinalis*						
5	*Buglossoides arvensis*			x		x	
6	*Buglossoides purpurocaerulea*						
7	*Cerinthe glabra*			x		x	
8	*Cerinthe minor*						
9	*Cynoglossum creticum*						
10	*Cynoglossum hungaricum*					x	
11	*Cynoglossum officinale*			x		x	
12	*Echium vulgare*			x		x	
13	*Lappula barbata*						
14	*Lappula squarrosa*					x	
15	*Lithospermum officinale*			x		x	
16	*Myosotis alpestris*				x	x	
17	*Myosotis scorpioides*					x	
18	*Myosotis sylvatica*					x	
19	*Onosma aucherana*					x	
20	*Onosma echioides*					x	
21	*Onosma heterophylla*					x	
22	*Onosma visianii*					x	
23	*Pulmonaria mollis*			x		x	
24	*Pulmonaria officinalis*			x		x	
25	*Pulmonaria rubra*					x	
26	*Symphytum bulbosum*					x	
27	*Symphytum officinale*			x		x	
28	*Symphytum ottomanum*					x	
29	*Symphytum tuberosum*					x	
	Brassiaceae						
1	*Alliaria petiolata*			x		x	
2	*Alyssoides utriculata*					x	
3	*Alyssum alyssoides*						

4	*Alyssum campestre*						
5	*Alyssum montanum*					x	
6	*Alyssum murale*					x	
7	*Alyssum turkestanicum*						
8	*Arabidopsis thaliana*					x	
9	*Arabis alpina*					x	
10	*Arabis auriculata*					x	
11	*Arabis glabra*					x	
12	*Arabis sagittata*						
13	*Arabis turrita*					x	
14	*Barbarea ballcana*					x	
15	*Barbarea vulgaris*					x	
16	*Capsela bursa-pastoris*			x		x	
17	*Cardamine amara*			x	x	x	
18	*Cardamine bulbifera*			x		x	
19	*Cardamine rivularis*					x	
20	*Dentaria bulbifera*				x	x	
21	*Descurainia sophia*					x	
22	*Draba lasiocarpa*					x	
23	*Draba muralis*					x	
24	*Erophila verna*					x	
25	*Erysimum cuspidatum*					x	
26	*Erysimum diffusum*						
27	*Lepidium campestre*						
28	*Lepidium graminifolium*						
29	*Lepidium perfoliatum*					x	
30	*Lepidium ruderale*					x	
31	*Lunaria annua*						
32	*Lunaria rediviva*					x	
33	*Nasturtium officinalis*			x		x	
34	*Raphanus raphanistrum*			x		x	
35	*Rorippa austriaca*						
36	*Rorippa palustris*						
37	*Rorippa prolifera*						
38	*Rorippa pyrenaica*					x	
39	*Rorippa sylvestris*					x	
40	*Rorippa thracica*					x	
41	*Sinapis arvensis*			x			

42	*Sisymbrium altissimum*						
43	*Sisymbrium loeselii*						
44	*Sisymbrium officinale*						
45	*Sisymbrium orientale*						
46	*Thlaspi alliaceum*			x		x	
47	*Thlaspi arvense*			x		x	
48	*Thlaspi kovatsii*					x	
49	*Thlaspi praecox*					x	
	Campanulaceae						
1	*Campanula alpina*				x	x	
2	*Campanula bononiensis*						
3	*Campanula cervicaria*					x	
4	*Campanula glomerata*					x	
5	*Campanula lanata*		Annex 2, Annex 3	x		x	
6	*Campanula lingulata*					x	
7	*Campanula moesiaca*					x	
8	*Campanula patula*					x	
9	*Campanula persicifolia*			x		x	
10	*Campanula rapunculoides*					x	
11	*Campanula rapunculus*						
12	*Campanula rotundifolia*					x	
13	*Campanula scutellata*						
14	*Campanula sparsa*						
15	*Campanula trachelium*					x	
16	*Campanula trojanensis*						
17	*Campanula velebitica*					x	
18	*Jasione bulgarica*		Annex 2, Annex 3			x	Bulgarian
	Caprifoliaceae						
1	*Lonicera nigra*					x	
2	*Lonicera xylosteum*			x	x	x	
3	*Sambucus nigra*			x		x	
4	*Sambucus racemosa*			x	x	x	
5	*Viburnum lantana*					x	
	Caryophyllaceae						
1	*Agrostemma githago*			x		x	
2	*Arenaria biflora*					x	

3	*Cerastium alpinum*					x	
4	*Cerastium arvense*					x	
5	*Cerastium banaticum*					x	
6	*Cerastium cerastoides*					x	
7	*Cerastium decalvans*					x	
8	*Cerastium dubium*					x	
9	*Cerastium fontanum*					x	
10	*Cerastium moesiacum*					x	
11	*Cerastium petricola*					x	
12	*Cerastium pumilum*					x	
13	*Cerastium rectum*						
14	*Cerastium semidecandrum*						
15	*Dianthus armeria*					x	
16	*Dianthus cruentus*					x	
17	*Dianthus deltoides*					x	
18	*Dianthus giganteus*					x	
19	*Dianthus microlepis*					x	Balkan
20	*Dianthus moesiacus*					x	
21	*Dianthus pelviformis*					x	
22	*Dianthus petraeus*					x	
23	*Dianthus tristis*					x	
24	*Gypsophila muralis*					x	
25	*Herniaria glabra*			x		x	
26	*Herniaria hirsuta*						
27	*Herniaria incana*						
28	*Lychnis coronaria*			x		x	
29	*Lychnis flos-cuculi*			x		x	
30	*Minuartia glomerata*					x	
31	*Minuartia hirsuta*					x	
32	*Minuartia recurva*					x	
33	*Minuartia saxifraga*					x	
34	*Moehringia pendula*					x	
35	*Paronychia cephalotes*					x	
36	*Sagina procumbens*					x	
37	*Saponaria bellidifolia*					x	
38	*Saponaria glutinosa*						
39	*Saponaria officinalis*						
40	*Scleranthus perennis*			x	x	x	

41	*Silene alba*					x	
42	*Silene armeria*					x	
43	*Silene conica*						
44	*Silene bupleuroides*					x	
45	*Silene dichotoma*						
46	*Silene flavescens*					x	
47	*Silene frivaldszkyana*						
48	*Silene gigantea*						
49	*Silene italica*						
50	*Silene noctiflora*						
51	*Silene otites*						
52	*Silene pusilla*					x	
53	*Silene roemeri*					x	
54	*Silene subconica*					x	
55	*Silene viridiflora*					x	
56	*Silene vulgaris*					x	
57	*Spergularia rubra*			x		x	
58	*Stellaria graminea*					x	
59	*Stellaria holostea*					x	
60	*Stellaria media*					x	
61	*Stellaria nemorum*					x	
62	*Stellaria pallida*					x	
63	*Stellaria palustris*						
64	*Viscaria vulgaris*			x		x	
	Celastraceae						
1	*Evonymus europaeus*			x		x	
2	*Evonymus latifolius*					x	
3	*Euonymus verrucosus*			x		x	
	Chenopodiaceae						
1	*Atriplex rosea*					x	
2	*Chenopodium album*			x		x	
3	*Chenopodium bonus-henricus*			x		x	
4	*Chenopodium botrys*						
	Cistaceae						
1	*Fumana procumbens*						
2	*Helianthemum nummularium*					x	
3	*Helianthemum salicifolium*						

4	*Rhodax canus*					x	
	Convolvulaceae						
1	*Convolvulus arvensis*			x		x	
2	*Convolvulus cantabrica*					x	
	Cornaceae						
1	*Cornus mas*			x		x	
2	*Cornus sanguinea*					x	
	Crassulaceae						
1	*Sedum acre*			x		x	
2	*Sedum album*			x		x	
3	*Sedum alpestre*					x	
4	*Sedum hispanicum*					x	
5	*Sedum maximum*			x		x	
6	*Sempervivum marmoreum*			x		x	
	Cuscutaceae						
1	*Cuscuta campestris*					x	
2	*Cuscuta europaea*			x		x	
	Dipsacaceae						
1	*Cephalaria laevigata*						
2	*Cephalaria transsylvanica*						
3	*Dipsacus fullonum*						
4	*Dipsacus laciniatus*					x	
5	*Dipsacus pilosus*					x	
6	*Knautia arvensis*			x		x	
7	*Knautia drymeja*					x	
8	*Knautia macedonica*					x	
9	*Knautia midzorensis*					x	Balkan
10	*Scabiosa argentea*						
11	*Scabiosa columbaria*					x	
12	*Scabiosa ochroleuca*			x		x	
13	*Scabiosa triniifolia*					x	
	Ericaceae						
1	*Arctostaphylos uva-ursi*			x	x	x	
2	*Bruckenthalia spiculifolia*				x	x	Balkan
3	*Vaccinium myrtillus*			x	x	x	
4	*Vaccinium vitis-idaea*			x	x	x	
5	*Vaccinium uliginosum*			x	x	x	
	Euphorbiaceae						

1	*Euphorbia amygdaloides*			x	x	x	
2	*Euphorbia barrelieri*					x	
3	*Euphorbia helioscopia*						
4	*Euphorbia plathyphyllos*						
5	*Euphorbia salicifolia*					x	
6	*Euphorbia serrulata*					x	
7	*Mercurialis perennis*			x	x	x	
	Fabaceae						
1	*Anthyllis vulneraria*			x		x	
2	*Astragalus cicer*					x	
3	*Astragalus glycyphyllos*			x		x	
4	*Chamaecytisus absinthioides subsp. absinthioides*				x	x	
5	*Chamaecytisus absinthioides subsp. rhodopaeus*						
6	*Chamaecytisus hirsutus*			x		x	
7	*Chamaespartium sagittale*			x		x	
8	*Coronilla varia*			x		x	
9	*Dorycnium herbaceum*					x	
10	*Genista carinalis*					x	
11	*Genista depressa*					x	
12	*Genista januensis*					x	
13	*Genista ovata*			x			
14	*Genista rumelica*					x	
15	*Genista tinctoria*			x		x	
16	*Lathyrus aphaca*						
17	*Lathyrus cicera*						
18	*Lathyrus grandiflorus*	EN				x	
19	*Lathyrus hirsutus*						
20	*Lathyrus latifolius*						
21	*Lathyrus laxiflorus*					x	
22	*Lathyrus niger*						
23	*Lathyrus nissolia*						
24	*Lathyrus pallescens*						
25	*Lathyrus pratensis*			x		x	
26	*Lathyrus sphaericus*						
27	*Lathyrus sylvestris*						
28	*Lathyrus tuberosus*						

29	*Lathyrus venetus*					x	
30	*Lathyrus vernus*						
31	*Lotus corniculatus*			x		x	
32	*Medicago falcata*					x	
33	*Medicago lupulina*					x	
34	*Medicago minima*						
35	*Medicago sativa*						
36	*Melilotus alba*			x		x	
37	*Ononis arvensis*					x	
38	*Robinia pseudoacacia*			x			
39	*Trifolium alpestre*			x		x	
40	*Trifolium aureum*					x	
41	*Trifolium arvense*						
42	*Trifolium badium*					x	
43	*Trifolium campestre*						
44	*Trifolium diffusum*					x	
45	*Trifolium dubium*						
46	*Trifolium echinatum*						
47	*Trifolium fragiferum*						
48	*Trifolium heldreichianum*					x	
49	*Trifolium hirtum*						
50	*Trifolium hybridum*					x	
51	*Trifolium incarnatum*						
52	*Trifolium medium*					x	
53	*Trifolium micranthum*						
54	*Trifolium montanum*					x	
55	*Trifolium ochroleucon*					x	
56	*Trifolium pallidum*					x	
57	*Trifolium pannonicum*			x		x	
58	*Trifolium patens*					x	
59	*Trifolium pratense*			x		x	
60	*Trifolium purpureum*					x	
61	*Trifolium repens*			x		x	
62	*Trifolium resupinatum*						
63	*Trifolium striatum*						
64	*Vicia angustifolia*						
65	*Vicia cassubica*						
66	*Vicia cordata*						

67	*Vicia cracca*			x		x	
68	*Vicia dalmatica*					x	
69	*Vicia dumetorum*					x	
70	*Vicia grandiflora*			x		x	
71	*Vicia hirsuta*						
72	*Vicia incana*					x	
73	*Vicia lathyroides*						
74	*Vicia melanops*						
75	*Vicia narbonensis*						
76	*Vicia pannonica*					x	
77	*Vicia peregrina*					x	
78	*Vicia pisiformis*						
79	*Vicia sativa*						
80	*Vicia sepium*					x	
81	*Vicia serratifolia*						
82	*Vicia tenuifolia*					x	
83	*Vicia tetrasperma*						
84	*Vicia varia*						
85	*Vicia villosa*					x	
	Fagaceae						
1	*Fagus sylvatica*			x	x	x	
2	*Quercus cerris*						
3	*Quercus frainetto*						
4	*Quercus petraea*						
5	*Quercus pubescens*					x	
6	*Quercus rubra*						
7	*Quercus suber*						
8	*Quercus virgiliana*						
	Gentianaceae						
1	*Centaurium erythraea*			x		x	
2	*Gentiana asclepiadea*				x	x	
3	*Gentiana lutea*	EN	Annex 3	x	x	x	
4	*Gentiana punctata*	EN	Annex 3	x	x	x	
5	*Gentiana verna*			x		x	
6	*Gentianella bulgarica*			x		x	Balkan
	Geraniaceae						
1	*Geranium bohemicum*	EN	Annex 3		x	x	
2	*Geranium divaricatum*						

3	*Geranium macrorrhizum*			x		x	
4	*Geranium phaeum*					x	
5	*Geranium pratens*					x	
6	*Geranium pusillum*					x	
7	*Geranium pyrenaicum*			x		x	
8	*Geranium reflexum*					x	
9	*Geranium robertianum*			x		x	
10	*Geranium rotundifolium*					x	
11	*Geranium sanguineum*			x		x	
12	*Geranium sylvaticum*			x	x	x	
	Grossulariaceae						
1	*Ribes alpinum*				x	x	
2	*Ribes petraeum*					x	
	Guttiferae						
1	*Hypericum cerastoides*			x		x	
2	*Hypericum maculatum*			x		x	
3	*Hypericum perforatum*			x	x	x	
4	*Hypericum tetrapterum*						
	Juglandaceae						
1	*Juglans regia*						
	Lamiaceae						
1	*Acinos alpinus*					x	
2	*Acinos arvensis*						
3	*Acinos suaveolens*			x		x	
4	*Ajuga chamaepitys*			x		x	
5	*Ajuga genevensis*						
6	*Ajuga laxmannii*			x		x	
7	*Ajuga pyramidalis*					x	
8	*Ajuga reptans*					x	
9	*Calamintha nepeta*						
10	*Calamintha sylvatica*					x	
11	*Clinopodium vulgare*			x		x	
12	*Galeopsis bifida*					x	
13	*Galeopsis ladanum*			x		x	
14	*Galeopsis speciosa*			x		x	
15	*Galeopsis tetrahit*			x		x	
16	*Lamium amplexicaule*						
17	*Lamium galeobdolon*						

18	*Lamium garganicum*					x	
19	*Lamium maculatum*			x		x	
20	*Lamium purpureum*						
21	*Mentha longifolia*					x	
22	*Mentha arvensis*			x		x	
23	*Mentha spicata*			x		x	
24	*Nepeta cataria*			x		x	
25	*Nepeta nuda*					x	
26	*Origanum vulgare*			x		x	
27	*Prunella vulgaris*			x		x	
28	*Salvia amplexicaulis*					x	
29	*Salvia glutinosa*			x		x	
30	*Salvia nemorosa*			x		x	
31	*Salvia pratensis*						
32	*Salvia sclarea*			x		x	
33	*Salvia verticillata*			x		x	
34	*Satureja montana*			x		x	
35	*Scutellaria altissima*			x		x	
36	*Scutellaria columnae*					x	
37	*Scutellaria galericulata*			x		x	
38	*Sideritis montana*			x		x	
39	*Stachys alpina*					x	
40	*Stachys annua*						
41	*Stachys germanica*			x		x	
42	*Stachys palustris*						
43	*Stachys plumosa*					x	
44	*Stachys recta*			x		x	
45	*Stachys sylvatica*			x		x	
46	*Teucrium chamaedrys*			x		x	
47	*Thymus moesiacus*			x		x	
48	*Thymus pulegioides*			x		x	
49	*Thymus sibthorpii*			x	x	x	
50	*Thymus vandasii*			x		x	
	Lentibulariaceae						
1	*Pinguicula balcanica*					x	Balkan
	Linaceae						
1	*Linum catharticum*			x		x	
2	*Linum hirsutum*					x	

3	*Linum tenuifolium*					x	
	Loranthaceae						
1	*Viscum album*			x		x	
	Lythraceae						
1	*Lythrum salicaria*			x		x	
	Malvaceae						
1	*Lavatera thuringiaca*			x		x	
2	*Alcea heldreichii*						
3	*Alcea pallida*						
4	*Alcea rosea*						
5	*Malva neglecta*			x		x	
6	*Malva pusilla*						
7	*Malva sylvestris*			x		x	
	Oleaceae						
1	*Fraxinus excelsior*			x		x	
2	*Fraxinus ornus*			x		x	
3	*Ligustrum vulgare*			x		x	
	Onagraceae						
1	*Epilobium alsinifolium*					x	
2	*Epilobium anagallidifolium*			x		x	
3	*Epilobium angustifolium*			x		x	
4	*Epilobium montanum*					x	
	Oxalidaceae						
1	*Oxalis acetosella*			x	x	x	
	Papaveraceae						
1	*Chelidonium majus*			x		x	
2	*Corydalis bulbosa*			x		x	
3	*Fumana procumbens*						
4	*Fumaria officinalis*						
5	*Fumaria rostellata*						
6	*Fumaria vaillantii*						
7	*Papaver dubium*						
8	*Papaver laevigatum*						
9	*Papaver rhoeas*						
	Plantaginaceae						
1	*Plantago altissima*						
2	*Plantago argentea*						
3	*Plantago atrata*					x	

4	*Plantago scabra*					x	
5	*Plantago gentianoides*					x	
6	*Plantago lanceolata*			x		x	
7	*Plantago major*			x		x	
8	*Plantago media*			x		x	
9	*Plantago subulata*						
	Plumbaginaceae						
1	*Armeria rumelica*					x	
	Polygalaceae						
1	*Polygala anatolica*					x	
2	*Polygala comosa*					x	
3	*Polygala major*			x		x	
4	*Polygala vulgaris*			x		x	
	Polygonaceae						
1	*Oxyria digyna*			x		x	
2	*Persicaria amphibia*						
3	*Persicaria lapathifolia*						
4	*Persicaria maculata*			x		x	
5	*Persicaria mitis*						
6	*Pleuropteropyrum undulatum*					x	
7	*Polygonum aviculare*			x	x		
8	*Rumex acetosa*			x		x	
9	*Rumex acetosella*			x		x	
10	*Rumex alpinus*			x	x	x	
11	*Rumex conglomeratus*					x	
12	*Rumex crispus*			x		x	
13	*Rumex kerneri*					x	
14	*Rumex obtusifolius*			x		x	
	Primulaceae						
1	*Anagalis arvensis*			x		x	
2	*Androsace elongata*						
3	*Androsace hedraeantha*					x	
4	*Androsace maxima*						
5	*Lysimachia nummularia*			x		x	
6	*Lysimachia punctata*					x	
7	*Lysimachia vulgaris*					x	
8	*Primula acaulis*						

9	*Primula deorum*	VU	Annex 3		x	x	Bulgarian / Glacial
10	*Primula elatior*			x		x	
11	*Primula farinosa*					x	Bulgarian
12	*Primula minima*				x	x	
13	*Primula veris*			x		x	
14	*Soldanella pindicola*					x	
15	*Soldanella pusilla*					x	
16	*Soldanella rhodopaea*					x	
	Pyrolaceae						
1	*Moneses uniflora*			x		x	
2	*Orthila secunda*			x		x	
3	*Pyrola chlorantha*			x		x	
4	*Pyrola media*					x	
5	*Pyrola minor*					x	
	Ranunculaceae						
1	*Aconitum burnatii*					x	
2	*Aconitum lycoctonum*			x		x	
3	*Aconitum variegatum*			x		x	
4	*Actaea spicata*			x		x	
5	*Adonis aestivalis*						
6	*Adonis flammea*						
7	*Anemone nemorosa*			x	x	x	
8	*Anemone ranunculoides*			x		x	
9	*Aquilegia aurea*		Annex 3		x	x	
10	*Caltha laeta*					x	
11	*Caltha palustris*			x		x	
12	*Clematis vitalba*			x			
13	*Helleborus odorus*			x		x	
14	*Hepatica nobilis*			x		x	
15	*Isopyrum thalictroides*						
16	*Nigella arvensis*						
17	*Ranunculus acris*					x	
18	*Ranunculus aquatilis*					x	
19	*Ranunculus arvensis*						
20	*Ranunculus auricomus*						
21	*Ranunculus bulbosus*						
22	*Ranunculus carinthiacus*					x	

23	*Rannunculus crenatus*					x	
24	*Ranunculus fallax*						
25	*Ranunculus ficaria*			x		x	
26	*Ranunculus flammula*			x		x	
27	*Ranunculus illyricus*					x	
28	*Ranunculus millefoliatus*						
29	*Ranunculus montanus*					x	
30	*Ranunculus nemorosus*					x	
31	*Ranunculus penicillatus*						
32	*Ranunculus platanifolius*				x	x	
33	*Ranunculus repens*			x		x	
34	*Ranunculus sardous*						
35	*Ranunculus sceleratus*						
36	*Ranunculus serbicus*					x	
37	*Ranunculus trichophyllus*					x	
38	*Thalictrum aquilegifolium*			x		x	
39	*Trollius europaeus*		Annex 3		x	x	
	Rhamnaceae						
1	*Frangula alnus*			x		x	
2	*Paliurus spina-christi*						
	Rosaceae						
1	*Agrimonia eupatoria*			x		x	
2	*Agrimonia procera*			x		x	
3	*Alchemilla acutiloba*			x		x	
4	*Alchemilla bulgarica*			x		x	
5	*Alchemilla catachnoa*	EN		x		x	Balkan
6	*Alchemilla cinerea*			x		x	
7	*Alchemilla connivens*			x		x	
8	*Alchemilla crinita*			x		x	
9	*Alchemilla erythropoda*			x		x	
10	*Alchemilla fissa*	EN		x		x	
11	*Alchemilla flabellata*			x		x	
12	*Alchemilla glabra*			x		x	
13	*Alchemilla glaucescens*			x		x	
14	*Alchemilla gracilis*			x		x	
15	*Alchemilla monticola*			x		x	
16	*Alchemilla obtusa*			x		x	
17	*Alchemilla reniformis*			x		x	

18	*Amygdalus communis*						
19	*Aremonia agrimonoides*					x	
20	*Crataegus monogyna*			x		x	
21	*Filipendula ulmaria*			x		x	
22	*Filipendula vulgaris*			x		x	
23	*Fragaria moschata*					x	
24	*Fragaria vesca*			x		x	
25	*Fragaria viridis*						
26	*Geum bulgaricum*		Annex 3		x	x	Balkan
27	*Geum coccineum*			x	x	x	
28	*Geum montanum*			x	x	x	
29	*Geum rivale*			x		x	
30	*Geum urbanum*			x		x	
31	*Malus dasyphylla*					x	
32	*Malus praecox*					x	
33	*Malus sylvestris*			x		x	
34	*Potentilla alba*			x		x	
35	*Potentilla argentea*			x		x	
36	*Potentilla erecta*			x		x	
37	*Potentilla haynaldiana*					x	
38	*Potentilla inclinata*						
39	*Potentilla micrantha*					x	
40	*Potentilla montenegrina*	CR	Annex 3		x	x	Balkan
41	*Potentilla neglecta*					x	
42	*Potentilla obscura*					x	
43	*Potentilla palustris*		Annex 2, Annex 3	x		x	
44	*Potentilla pedata*					x	
45	*Potentilla pilosa*					x	
46	*Potentilla regis-borisii*					x	
47	*Potentilla reptans*			x		x	
48	*Potentilla rupestris*			x		x	
49	*Potentilla sulphurea*					x	
50	*Potentilla ternata*					x	
51	*Prunus avium*						
52	*Prunus cerasifera*					x	
53	*Prunus domestica*						
54	*Pyrus communis*						
55	*Rosa agrestis*						

56	*Rosa canina*			x	x	x	
57	*Rosa galica*						
58	*Rosa micrantha*						
59	*Rosa pendulina*					x	
60	*Rubus caesius*			x		x	
61	*Rubus hirtus*			x		x	
62	*Rubus idaeus*			x	x		
63	*Sanguisorba officinalis*			x		x	
64	*Sorbus aucuparia*			x	x	x	
65	*Sorbus domestica*						
66	*Spiraea media*					x	
	Rubiaceae						
1	*Asperula odorata*				x	x	
2	*Cruciata glabra*					x	
3	*Cruciata laevipes*			x		x	
4	*Galium album*					x	
5	*Galium anisophyllon*					x	
6	*Galium aparine*			x		x	
7	*Galium boreale*					x	
8	*Galium debile*						
9	*Galium divaricatum*					x	
10	*Galium elongatum*						
11	*Galium flavescens*						
12	*Galium lucidum*			x		x	
13	*Galium odoratum*			x	x	x	
14	*Galium palustre*					x	
15	*Galium pseudoaristatum*						
16	*Galium rivale*					x	
17	*Galium rotundifolium*					x	
18	*Galium tenuissimum*						
19	*Galium tricornutum*						
20	*Galium verum*			x		x	
	Salicaceae						
1	*Populus alba*						
2	*Populus canescens*						
3	*Populus nigra*						
4	*Populus tremula*			x		x	
5	*Salix alba*					x	

6	*Salix caprea*			x	x	x	
7	*Salix fragilis*					x	
8	*Salix purpurea*			x		x	
9	*Salix triandra*					x	
10	*Salix waldsteiniana*					x	
	Santalaceae						
1	*Thesium alpinum*					x	
	Saxifragaceae						
1	*Chrysosplenium alternifolium*			x	x	x	
2	*Parnasia palustris*			x		x	
3	*Saxifraga bryoides*					x	
4	*Saxifraga bulbifera*			x		x	
5	*Saxifraga exsarata*					x	
6	*Saxifraga rotundifolia*			x	x	x	
7	*Saxifraga sempervivum*					x	
8	*Saxifraga stellaris*					x	
9	*Saxifraga tridactilites*						
	Scrophulariaceae						
1	*Bartsia alpina*					x	
2	*Digitalis grandiflora*			x		x	
3	*Digitalis lanata*			x		x	
4	*Digitalis viridiflora*					x	
5	*Euphrasia montana*			x		x	
6	*Euphrasia sp. diversa*			x		x	
7	*Linaria dalmatica*					x	
8	*Linaria genistifolia*					x	
9	*Linaria grandiflora*					x	
10	*Linaria pelisseriana*						
11	*Linaria vulgaris*			x		x	
12	*Melampyrum arvense*					x	
13	*Melampyrum pratense*					x	
14	*Melampyrum scardicum*					x	
15	*Melampyrum sylvaticum*				x	x	
16	*Odontites glutinosa*					x	
17	*Odontites lutea*						
18	*Pedicularis orthantha*					x	
19	*Pedicularis verticillata*					x	
20	*Rhinanthus angustifolius*					x	

21	*Rhinanthus minor*			x		x	
22	*Rhinanthus wagneri*					x	
23	*Scrophularia nodosa*			x		x	
24	*Scrophularia scopolii*					x	
25	*Verbascum abietinum*						
26	*Verbascum banaticum*						
27	*Verbascum blattaria*						
28	*Verbascum chaixii*						
29	*Verbascum densiflorum*			x	x	x	
30	*Verbascum glabratum*					x	
31	*Verbascum lanatum*					x	
32	*Verbascum longifolium*			x		x	
33	*Verbascum nigrum*						
34	*Verbascum phlomoides*			x		x	
35	*Verbascum phoeniceum*					x	
36	*Verbascum speciosum*					x	
37	*Veronica alpina*			x		x	
38	*Veronica austriaca*			x		x	
39	*Veronica beccabunga*			x		x	
40	*Veronica bellidioides*			x	x	x	
41	*Veronica chamaedrys*			x	x	x	
42	*Veronica hederifolia*						
43	*Veronica krumovii*						
44	*Veronica montana*					x	
45	*Veronica officinalis*			x		x	
46	*Veronica orchidea*						
47	*Veronica persica*						
48	*Veronica praecox*						
49	*Veronica prostrata*						
50	*Veronica scardica*					x	
51	*Veronica scutellata*					x	
52	*Veronica serpyllifolia*					x	
53	*Veronica teucrium*						
54	*Veronica triloba*						
55	*Veronica urticifolia*				x	x	
56	*Veronica verna*					x	
	Simaroubaceae						
1	*Ailanthus altissima*						

	Solanaceae						
1	*Atropa belladonna*			x		x	
2	*Datura stramonium*						
3	*Solanum alatum*						
4	*Solanum dulcamara*						
5	*Solanum nigrum*						
	Thymelaeaceae						
1	*Daphne mezereum*					x	
	Tiliaceae						
1	*Tilia cordata*			x		x	
2	*Tilia platyphylos*			x		x	
3	*Tilia tomentosa*			x		x	
	Ulmaceae						
1	*Ulmus glabra*			x		x	
2	*Ulmus minor*						
	Urticaceae						
1	*Urtica dioica*			x		x	
	Valerianaceae						
1	*Valeriana officinalis*			x		x	
2	*Valeriana tripteris*				x	x	
	Violaceae						
1	*Viola alba*						
2	*Viola ambigua*						
3	*Viola arvensis*					x	
4	*Viola canina*						
5	*Viola dacica*				x	x	
6	*Viola hirta*						
7	*Viola jordanii*						
8	*Viola kitaibeliana*						
9	*Viola odorata*						
10	*Viola riviniana*					x	
11	*Viola rupestris*					x	
12	*Viola tricolor*			x		x	
	Liliopsida						
	Alliaceae						
1	*Allium carinatum*					x	
2	*Allium flavum*					x	

3	*Allium guttatum*						
4	*Allium melanantherum*					x	
5	*Allium moschatum*						
6	*Allium oleraceum*					x	
7	*Allium schoenoprasum*			x		x	
8	*Allium rotundum*						
9	*Allium scorodoprasum*						
10	*Allium sphaerocephalon*						
11	*Allium thracicum*					x	
12	*Allium ursinum*			x		x	
	Alismataceae						
1	*Alisma gramineum*						
2	*Alisma lanceolatum*						
	Amarilidaceae						
1	*Galanthus elwesii*		Annex 3	x		x	
2	*Galanthus nivalis*		Annex 3				
	Araceae						
1	*Arum maculatum*			x		x	
	Cyperaceae						
1	*Carex acuta*				x	x	
2	*Carex acutiformis*						
3	*Carex atrata*				x	x	
4	*Carex bueckii*						
5	*Carex caryophyllea*						
6	*Carex curta*					x	
7	*Carex curvula*				x	x	
8	*Carex digitata*					x	
9	*Carex distans*						
10	*Carex divisa*						
11	*Carex divulsa*					x	
12	*Carex echinata*					x	
13	*Carex ericetorum*					x	
14	*Carex flacca*						
15	*Carex hartmanii*					x	
16	*Carex hallerana*						
17	*Carex hirta*					x	
18	*Carex melanostachya*						
19	*Carex michelii*						

20	*Carex montana*					x	
21	*Carex muricata*					x	
22	*Carex nigra*					x	
23	*Carex otrubae*						
24	*Carex ovalis*					x	
25	*Carex pallescens*					x	
26	*Carex panicea*					x	
27	*Carex paniculata*					x	
28	*Carex praecox*						
29	*Carex pseudocyperus*					x	
30	*Carex pyrenaica*					x	
31	*Carex remota*					x	
32	*Carex riloensis*					x	
33	*Carex riparia*						
34	*Carex rostrata*					x	
35	*Carex sempervirens*					x	
36	*Carex serotina*					x	
37	*Carex spicata*					x	
38	*Carex sylvatica*					x	
39	*Carex tomentosa*						
40	*Carex tricolor*					x	Bulgarian
41	*Carex umbrosa*					x	
42	*Carex vesicaria*					x	
43	*Eriophorum angustifolium*			x		x	
44	*Eriophorum latifolium*			x		x	
45	*Eriophorum vaginatum*			x		x	
46	*Trichophorum cespitosum*					x	
	Iridaceae						
1	*Crocus biflorus*					x	
2	*Crocus chrysanthus*			x		x	
3	*Crocus flavus*					x	
4	*Crocus veluchensis*					x	
5	*Gladiolus communis*			x		x	
6	*Gladiolus imbricatus*			x		x	
7	*Iris graminea*						
8	*Iris pseudacorus*						
9	*Iris pumila*						
10	*Iris variegata*					x	

	Juncaceae						
1	*Juncus alpinus*				x	x	
2	*Juncus effusus*					x	
3	*Juncus trifidus*				x	x	
4	*Juncus tromasii*					x	
5	*Luzula alpinopillosa*					x	
6	*Luzula forsteri*					x	
7	*Luzula luzuloides*					x	
8	*Luzula maxima*				x	x	
9	*Luzula sudetica*					x	
10	*Luzula sylvatica*					x	
	Liliaceae						
1	*Asparagus tenuifolius*					x	
2	*Colchicum autumnale*			x		x	
3	*Convallaria majalis*			x		x	
4	*Gagea lutea*					x	
5	*Hyacinthella leucophaea*					x	
6	*Lilium jankae*	NT	Annex 2, Annex 3		x	x	
7	*Lilium martagon*			x		x	
8	*Muscari botryoides*					x	
9	*Muscari neglectum*						
10	*Ornithogalum boucheanum*						
11	*Ornithogalum comosum*						
12	*Ornithogalum kochii*					x	
13	*Ornithogalum montanum*					x	
14	*Ornithogalum narbonense*						
15	*Ornithogalum nutans*						
16	*Ornithogalum pyrenaicum*						
17	*Ornithogalum umbellatum*						
18	*Paris quadrifolia*			x	x	x	
19	*Polygonatum multiflorum*					x	
20	*Polygonatum odoratum*					x	
21	*Scilla bifolia*			x	x	x	
22	*Veratrum album ssp. lobelianum*			x	x	x	
	Orchidaceae						
1	*Dactylorhiza cordigera*			x	x	x	

2	*Dactylorhiza sambucina*			x		x	
3	*Epipactis helleborine*					x	
4	*Epipactis microphylla*					x	
5	*Gymnadenia frivaldskyana*					x	
6	*Listera cordata*		Annex 3			x	
7	*Listera ovata*					x	
8	*Neottia nidus-avis*					x	
9	*Nigritella nigra*					x	
10	*Orchis elegans*						
11	*Orchis morio*			x		x	
12	*Orchis ovalis*					x	
13	*Orchis purpurea*			x		x	
14	*Orchis tridentata*			x		x	
15	*Platanthera bifolia*			x		x	
16	*Pseudorchis albida*					x	
17	*Pseudorchis frivaldii*						
	Poaceae						
1	*Achnatherum bromoides*						
2	*Aegilops cylindrica*						
3	*Agrostis canina*					x	
4	*Agrostis capillaris*					x	
5	*Agrostis castellana*						
6	*Agrostis rupestris*				x	x	
7	*Aira elegantissima*						
8	*Alopecurus gerardi*					x	
9	*Alopecurus riloensis*					x	
10	*Anthoxanthum odoratum*			x		x	
11	*Apera spica-venti*						
12	*Avenula pubescens*					x	
13	*Bellardiochloa variegata*					x	
14	*Brachypodium sylvaticum*						
15	*Briza media*			x		x	
16	*Bromus arvensis*					x	
17	*Bromus inermis*						
18	*Bromus mollis*					x	
19	*Bromus racemosus*						
20	*Bromus ramosus*					x	
21	*Bromus secalinus*						

22	*Bromus tectorum*						
23	*Calamagrostis arundinacea*				x	x	
24	*Calamagrostis epigeios*					x	
25	*Calamagrostis vilosa*					x	
26	*Cynosurus cristatus*					x	
27	*Cynosurus echinatus*						
28	*Dactylis glomerata*					x	
29	*Deschampsia caespitosa*				x	x	
30	*Deschampsia sambucina*					x	
31	*Elymus caninus*					x	
32	*Elymus hispidus*					x	
33	*Festuca airoides*				x	x	
34	*Festuca altissima*						
35	*Festuca arundinacea*						
36	*Festuca dalmatica*					x	
37	*Festuca drymeja*						
38	*Festuca gigantea*						
39	*Festuca heterophylla*						
40	*Festuca nigrescens*					x	
41	*Festuca paniculata*					x	
42	*Festuca picturata*						
43	*Festuca pratensis*						
44	*Festuca pseudodalmatica*						
45	*Festuca riloensis*				x	x	Balkan
46	*Festuca rubra*				x	x	
47	*Festuca rupicola*						
48	*Festuca valesiaca*						
49	*Festuca valida*				x	x	
50	*Hordelymus europaeus*					x	
51	*Koeleria macrantha*					x	
52	*Koeleria mitruschii*					x	
53	*Koeleria penzesii*					x	
54	*Lolium perenne*					x	
55	*Lolium temulentum*					x	
56	*Melica uniflora*						
57	*Milium effusum*					x	
58	*Molinia caerulea*					x	
59	*Nardus stricta*				x	x	

60	*Phleum alpinum*				x	x	
61	*Phleum graecum*						
62	*Phleum phleoides*					x	
63	*Phleum pratense*					x	
64	*Poa alpina*				x	x	
65	*Poa annua*					x	
66	*Poa bulbosa*						
67	*Poa compressa*					x	
68	*Poa laxa*					x	
69	*Poa media*					x	
70	*Poa nemoralis*					x	
71	*Poa pratensis*					x	
72	*Poa sylvicola*					x	
73	*Poa trivialis*						
74	*Sesleria phleoides*				x	x	
75	*Sesleria comosa*				x	x	
76	*Stipa borysthenica*						
77	*Stipa epilosa*					x	
78	*Stipa pulcherrima*					x	
79	*Vulpia myurus*					x	

CR – Critically Endangered, **EN** – Endangered, **VU** –

ANNEX B

List of invertebrates in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Arthropoda Arthropods Araneae Spiders	
1	*Brachythele denieri* (Simon, 1916)	
2	*Steatoda phalerata* (Panzer, 1801)	
3	*Theridion impressum* L. Koch, 1881	
4	*Theridion sisyphium* (Clerck, 1757)	
5	*Bolyphantes alticeps* (Sundevall, 1832)	
6	*Centromerus paucidentatus* Deltshev, 1983	
7	*Dicymbium nigrum* (Blackwall, 1834)	
8	*Diplocephalus foraminifer* (O. P. Cambridge, 1875)	
9	*Diplostyla concolor* (Wider, 1834)	
10	*Gonatium orientale* Fage, 1931	
11	*Gonatium paradoxum* (L. Koch, 1869)	
12	*Lepthyphantes mansuetus* (Thorell, 1875)	
13	*Linyphia triangularis* (Clerck, 1757)	
14	*Meioneta rurestris* (C. L. Koch, 1836)	
15	*Microlinyphia pusilla* (Sundewall, 1829)	
16	*Microneta viaria* (Blackwall, 1841)	
17	*Oedothorax agrestis* (Blackwall, 1853)	
18	*Tapinopa longidens* (Wider, 1834)	
19	*Walckenaeria alticeps* (Denis, 1952)	
20	*Metellina segmentata* (Clerck, 1757)	
21	*Araneus diadematus* Clerck, 1757	
22	*Mangora acalypha* (Walckenaer, 1802)	
23	*Hogna radiata* (Latreille, 1817)	
24	*Pardosa albatula* (Roewer, 1951)	
25	*Pardosa amentata* (Clerck, 1757)	
26	*Pardosa lugubris* (Walckenaer, 1802)	
27	*Pardosa mixta* (Kulczynski, 1887)	
28	*Pardosa tasevi* Buchar, 1968	
29	*Pirata hygrophilus* (Thorell, 1872)	
30	*Trochosa terricola* Thorell, 1856	
31	*Cybaeus angustiarum* L. Koch, 1868	
32	*Coelotes jurinitschi* (Drensky, 1915)	
33	*Coelotes kulczynskii* (Drensky, 1917)	
34	*Clubiona neglecta* O.P. Cambridge, 1862	
35	*Zodarion morosum* Denis, 1935	
36	*Drassodes pubescens* Thorell, 1856	
37	*Micaria pulicaria* (Sundewall, 1831)	
38	*Zelotes pusillus* (C. L. Koch, 1833)	
39	*Zora pardalis* Simon, 1878	
40	*Zora silvestris* Kulczynski, 1897	
41	*Philodromus aureolus* (Clerck, 1757)	

42	*Xysticus macedonicus* Silhavy, 1944	
43	*Heliophanus cupreus* (Walckenaer, 1802)	
44	*Heliophanus melinus* L. Koch, 1867	
45	*Leiobunum rumelicum* Silhavy, 1965	
46	*Rafalskia olympica* (Kulczynski, 1903)	
47	*Parasitus kraepelini* (Berlese, 1904)	
48	*Parasitus lunulatus* (Muller, 1859)	
49	*Pergamasus crassipes* (Linnaeus, 1758)	
50	*Veigaia nemorensis* (C. L. Koch, 1839)	
51	*Haemogamasus hirsutosimilis* Willmann, 1952	
52	*Haemogamasus hirsutus* Berlese, 1889	
53	*Haemogamasus horridus* Michael, 1892	
54	*Hirstionyssus eusoricus* Bregetova, 1956	
55	*Hirstionyssus gudauricus* Razumova, 1957	
56	*Hirstionyssus isabellinus* (Oudemans, 1913)	
57	*Hirstionyssus musculi* (Johnston, 1849)	
58	*Hirstionyssus pauli* Willmann, 1952	
59	*Hypoaspis oblonga* (Halbert, 1915)	
60	*Laelaps agilis* (C. L. Koch, 1836)	
61	*Laelaps clethrionomydis* Lange, 1955	
62	*Myonyssus ingricus* Bregetova, 1956	
63	*Macrocheles glaber* (Muller, 1860)	
64	*Zumptiella coreaensis* Ah, 1964	
	Acariformes Mites	
65	*Dermacarus sciurinus* (C. L. Koch, 1841)	
66	*Metalistrophorus pagenstecheri* (Haller, 1880)	
67	*Sciurocoptes sciurinus* (Hennemann, 1910)	
68	*Neotrombicula monticola* Kolebinova, 1974	
	Crustacea Crustaceans	
69	*Daphnia longispina* (O. F. Muller, 1785)	
70	*Daphnia rosea* Sars, 1862	
71	*Alona affinis* (Leydig, 1860)	
72	*Alonella excise* (Fischer, 1854)	
73	*Chydorus sphaericus* (O. F. Muller, 1785)	
74	*Mixodiaptomus tatricus* (Wierzejskii, 1882)	
75	*Eucyclops serrulatus* (Fischer, 1851)	
76	*Austropotamobius torrentium* (Schrank, 1803)	
	Chilopoda Centipedes	
77	*Eupolybothrus grossipes* (C. L. Koch, 1847)	
78	*Harpolithobius anodus dentatus* Matic, 1957	
79	*Lithobius forficatus* (Linnaeus, 1758)	
80	*Lithobius mutabilis* L. Koch, 1862	
81	*Lithobius schuleri* Verhoeff, 1925	
82	*Lithobius beroni* Negrea, 1965	
83	*Lithobius burzenlandicus*	
84	*Enantiulus nanus* (Latzel, 1884)	
85	*Leptoiulus borisi* Verhoeff, 1926	
86	*Leptoiulus trilineatus bureschi* Verhoeff, 1926	
87	*Megaphyllum cf. transsylvanicum* (Verhoeff, 1897)	

88	*Pachyiulus hungaricus* (Karsch, 1881)	
89	*Unciger transsylvanicus* (Verhoeff, 1899)	
90	*Polyzonium germanicum* Brandt, 1831	
	Insecta Insects Ephemeroptera Mayflies	
91	*Baetis alpinus* (Pictet, 1843)	
92	*Baetis muticus* (Linnaeus, 1758)	
93	*Baetis rhodani* (Pictet, 1843)	
94	*Ecdyonurus carpaticus vitoshensis* Jacob & Braasch, 1984	
95	*Ecdyonurus subalpinus* (Klapalek, 1906)	
96	*Epeorus sylvicola* (Pictet, 1865)	
97	*Rhithrogena germanica* Eaton, 1885	
98	*Ephemerella mucronata* (Bengtsson, 1909)	
99	*Ephemera danica* Mueller, 1764	
100	*Serratella maculocaudata* Ikonomov, 1961	CR
	Blattodea Cockroaches	
101	*Ectobius balcani* Ramme, 1923	
102	*Ectobius lapponicus* (Linnaeus, 1758)	
103	*Blatta orientalis* Linnaeus, 1758	
104	*Blattella germanica* Linnaeus, 1767	
	Orthoptera (Grasshoppers, Locusts and Crickets)	
105	*Anterastes serbicus* Brunner von Wattenwyl, 1882	
106	*Metrioptera aroldi* Ramme, 1933	
107	*Pholidoptera frivaldskyi* (Hermann, 1871)	
108	*Poecilimon affinis rilensis* Peshev, 1980	
109	*Poecilimon orbelicus* Pancic, 1883	
110	*Poecilimon thoracicus* (Fieber, 1853)	
111	*Tettigonia viridissima* Linnaeus, 1758	
112	*Tetrix tenuicornis* Sahlberg, 1893	
113	*Aeropedellus variegatus* (Fischer de Waldheim, 1846)	
114	*Chorthippus apricarius* (Linnaeus, 1758)	
115	*Chorthippus brunneus* (Thunberg, 1815)	
116	*Chorthippus parallelus* (Zetterstedt, 1821)	
117	*Dociostaurus brevicollis* (Eversmann, 1848)	
118	*Euthystira brachyptera* (Ocskay, 1826)	
119	*Gomphocerippus rufus* (Linnaeus, 1758)	
120	*Gomphocerus sibiricus* (Linnaeus, 1767)	
121	*Omocestus viridulus* (Linnaeus, 1758)	
122	*Stenobothrus stigmaticus faberi* Harz, 1975	
	Plecoptera Stoneflies	
123	*Protonemura hrabei* Rauser, 1956	
124	*Isoperla buresi* Rauser, 1962	
	Heteroptera True bugs	
125	*Sigara (Pseudovermicorixa) nigrolineata* (Fieber, 1848)	
126	*Gerris costai fieberi* Stichel, 1938	
127	*Gerris lacustris* (Linnaeus, 1758)	
128	*Gerris thoracicus* Schummel, 1832	
129	*Velia saulii serbica* Tam.	
130	*Hebrus pussilus* (Fallen, 1807)	

131	*Hebrus ruficeps* Thomson, 1871	
132	*Notonecta glauca* Linnaeus, 1758	
133	*Notonecta viridis* Delacurt, 1909	
134	*Adelphocoris lineolatus* (Goeze, 1778)	
135	*Adelphocoris seticornis* (Fabricius, 1775)	
136	*Alloeotomus germanicus* Wagner, 1939	
137	*Alloeotomus gothicus* (Fallen, 1808)	
138	*Amblytylus nasutus* (Kirschbaum, 1856)	
139	*Atractotomus magnicornis* Fallen, 1807	
140	*Blepharidopterus angulatus* (Fallen, 1807)	
141	*Brachycoleus decolor* Reuter, 1887	
142	*Calocoris affinis* (Herrich-Schaffer, 1835)	
143	*Calocoris alpestris* (Meyer-Dur, 1843)	
144	*Calocoris angularis* (Fieber, 1864)	
145	*Calocoris cintipes* (Costa, 1852)	
146	*Calocoris fulvomaculatus* (De Geer, 1773)	
147	*Camptozygum aequalis* (Vuillefroy, 1789)	
148	*Campylomma verbasci* (Meyer-Dur, 1843)	
149	*Capsodes gothicus* (Linnaeus, 1758)	
150	*Capsus ater* (Linnaeus, 1758)	
151	*Charagochilus gyllenhali* (Fallen, 1807)	
152	*Chlamidatus pullus* (Reuter, 1870)	
153	*Chlamidatus pulicarius* (Fallen, 1807)	
154	*Cremnocephalus alpestris* Wagner, 1942	
155	*Criocoris crassicornis* (Hahn, 1834)	
156	*Criocoris sulcicornis* (Kirschbaum, 1856)	
157	*Deraeocoris (Camptobrochis) serenus* Douglas & Scott, 1868	
158	*Deraeocoris lutescens* (Schilling, 1837)	
159	*Dichrooscytus valesianus* Fieber, 1861	
160	*Dicyphus digitalis* Josifov, 1958	
161	*Dicyphus errans* (Wolff, 1804)	
162	*Dicyphus pallidus* (Herrich-Schaffer, 1836)	
163	*Dimorphocoris fuscus* Joakimoff, 1909	
164	*Dionconotus neglectus* (Fabricius, 1798)	
165	*Europiella albipennis* (Fallen, 1825)	
166	*Globiceps flavomaculatus* (Fabricius, 1794)	
167	*Halticus apterus* (Linnaeus, 1761)	
168	*Heterocordylus genistae* (Scopoli, 1763)	
169	*Heterocordylus leptocerus* (Kirschbaum, 1856)	
170	*Hoplpmachus thunbregi* (Fallen, 1807)	
171	*Leptoterna dolobrata* (Linnaeus, 1758)	
172	*Leptoterna ferrugta* (Fallen, 1807)	
173	*Liocoris tripustulatus* (Fabricius, 1781)	
174	*Lopus decolor* (Fallen, 1807)	
175	*Lygocoris contaminates* (Fallen, 1807)	
176	*Lygocoris pabulinus* (Linnaeus, 1761)	
177	*Lygocoris viridis* (Fallen, 1807)	
178	*Lygus rugulipennis* Poppius, 1912	
179	*Lygus wagneri* Remane, 1955	

180	*Macrolophus pygmaeus* (Rambur, 1839)	
181	*Malacocoris chlorizans* (Panzer, 1794)	
182	*Mecomma dispar* (Boheman, 1852)	
183	*Megaloceroea recticornis* (Geoffroy, 1787)	
184	*Megalocoleus molliculus* (Fallen, 1807)	
185	*Megalocoleus pilosus* (Schrank, 1801)	
186	*Monalocoris filicis* (Linnaeus, 1758)	
187	*Montanorthops montanus* (Schilling, 1837)	
188	*Notostira erratica* (Linnaeus, 1758)	
189	*Notostira elongata* (Geoffroy, 1785)	
190	*Oncotylus punctipes* Reuter, 1873	
191	*Orthocephalus saltator* (Hahn, 1835)	
192	*Orthocephalus vittipennis* (Herrich-Schaffer, 1836)	
193	*Orthonotus rufifrons* (Fallen, 1807)	
194	*Orthops basalis* (Costa, 1852)	
195	*Orthops kalmi* (Linnaeus, 1758)	
196	*Orthotylus diaphanous* (Kirschbaum, 1856)	
197	*Orthotylus flavosparsus* (C. Sahlberg, 1842)	
198	*Orthotylus interpositus* Schmidt, 1938	
199	*Orthotylus marginalis* Reuter, 1856	
200	*Orthotylus obscurus* Reuter, 1875	
201	*Orthotylus prasinus* (Fallen, 1829)	
202	*Orthotylus virens* (Fallen, 1807)	
203	*Parapsallus vitellinus* (Scholtz, 1847)	
204	*Phoenicocoris obscurellus* (Fallen, 1829)	
205	*Phylus coryli* (Linnaeus, 1758)	
206	*Phytocoris longipennis* Flor, 1861	
207	*Phytocoris pini* Kirschbaum, 1856	
208	*Phytocoris ulmi* (Linnaeus, 1758)	
209	*Phytocoris varipes* Boheman, 1853	
210	*Phytocoris cinnamopterus* (Kirschbaum, 1856)	
211	*Pinalitus rubricatus* (Fallen, 1807)	
212	*Placochilus seladonicus* (Fallen, 1807)	
213	*Plagiognathus alpinus* (Reuter, 1876)	
214	*Plagiognathus arbustorum* (Fabricius, 1794)	
215	*Plagiognathus chrysanthemi* (Wolff, 1804)	
216	*Polymerus cognatus* (Fieber, 1856)	
217	*Polymerus palustris* (Reuter, 1905)	
218	*Polymerus unifasciatus* (Fabricius, 1794)	
219	*Psallus ambiguus* (Fallen, 1807)	
220	*Salicarus roseri* (Herrich-Schaffer, 1838)	
221	*Stenodema calcaratum* (Fallen, 1807)	
222	*Stenodema holsatum* (Fabricius, 1787)	
223	*Stenodema laevigatum* (Linnaeus, 1758)	
224	*Stenodema virens* (Linnaeus, 1767)	
225	*Strongylocoris leucocephalus* (Linnaeus, 1758)	
226	*Tinicephalus hortulanus* (Meyer-Dur, 1843)	
227	*Trygonotylus coelestialium* (Kirkadly, 1902)	
228	*Acompocoris alpinus* Reuter, 1875	

229	*Anthocoris confusus* Reuter, 1884	
230	*Anthocoris nemorum* (Linnaeus, 1761)	
231	*Anthocoris nemoralis* (Fabricius, 1794)	
232	*Orius minutus* (Linnaeus, 1758)	
233	*Orius niger* Wolff, 1804	
234	*Aptus mirmicoides* O. Costa, 1834	
235	*Himacerus apterus* (Fabricius, 1798)	
236	*Nabicula limbata* (Dahlbom, 1854)	
237	*Nabis rugosus* (Linnaeus, 1758)	
238	*Rhinocoris annulatus* (Linnaeus, 1758)	
239	*Rhinocoris iracundus* Poda, 1761	
240	*Phymata crassipes* (Fabricius, 1794)	
241	*Derephysia foliacea* (Fallen, 1807)	
242	*Dictyla echii* (Schrank, 1782)	
243	*Dictyonota strichnocera* Fieber, 1844	
244	*Kalama tricornis* (Schrank, 1801)	
245	*Lasiacantha capucina* (Germar, 1836)	
246	*Oncochila scapularis* (Fieber, 1844)	
247	*Physatocheila costata* (Fabricius, 1794)	
248	*Physatocheila dumetorum* (Herrich-Schaffer, 1838)	
249	*Tingis auriculata* (Costa, 1847)	
250	*Tingis cardui* (Linnaeus, 1758)	
251	*Tingis reticulata* (Herrich-Schaffer, 1836)	
252	*Piesma capitatum* (Wolff, 1804)	
253	*Macrosaldula scotica* (Curtis, 1835)	
254	*Macrosaldula variabilis connectens* (Horvath, 1888)	
255	*Saldula arenicola* (Schrank, 1847)	
256	*Saldula melanoscela* (Fieber, 1859)	
257	*Saldula orthochila* (Fieber, 1859)	
258	*Aneurur avenius* Dufour, 1833	
259	*Aradus cinamoneus* Panzer, 1794	
260	*Aradus conspicuus* Herrich-Schaffer, 1837	
261	*Aradus depressus* (Fabricius, 1794)	
262	*Aradus versicolor* Herrich-Schaffer, 1835	
263	*Berytinus minor* (Herrich-Schaffer, 1835)	
264	*Gampsocoris culicinus* Seidenstuecker	
265	*Neides tipularius* (Linnaeus, 1758)	
266	*Camptotelus lineolatus* (Schilling, 1829)	
267	*Cymus claviculus* (Fallen, 1807)	
268	*Cymus glandicolor* Hahn, 1832	
269	*Drymus sylvaticus* (Schilling, 1829)	
270	*Drymus brunneus* (R. Sahlberg, 1848)	
271	*Emblethis griseus* (Wolff, 1802)	
272	*Eremocoris abietis* (Linnaeus, 1758)	
273	*Eremocoris fenestratus* (Herrich-Schaffer, 1839)	
274	*Gastrodes abietum* Bergroth, 1914	
275	*Gastrodes grossipes* (De geer, 1914)	
276	*Geocoris megacephalus* (Rossi,)	
277	*Graptopeltus lynceus* (Fabricius, 1775)	

278	*Heterogaster arthemisiae* Schilling, 1829	
279	*Heterogaster urticae* (Fabricius, 1775)	
280	*Horvathiolus superbus* (Pollich, 1781)	
281	*Kleydoceris resede* (Panzer, 1807)	
282	*Lygaeus equestris* (Linnaeus, 1758)	
283	*Lygaeus saxatilis* (Scopoli, 1763)	
284	*Megalonotus antennatus* (Schilling, 1829)	
285	*Megalonotus chiragra* (Fabricius, 1794)	
286	*Megalonotus emarginatus* (Rey, 1888)	
287	*Megalonotus sabulicolus* (Thomson, 1870)	
288	*Metopoplax origami* (Kolenati, 1845)	
289	*Nysius cymoides* (Spinola, 1837)	
290	*Nysius helveticus* (Herrich-Schaffer, 1850)	
291	*Nysius jacobaeae* (Schilling, 1829)	
292	*Nysius senecionis* (Schilling, 1829)	
293	*Nysius thymi* (Wolff, 1804)	
294	*Ortholomus punctipennis* (Herrich-Schaffer, 1838)	
295	*Oxycarenus modestus* (Fallen, 1829)	
296	*Oxycarenus pallens* (Herrich-Schaffer, 1850)	
297	*Peritrechus geniculatus* (Hahn, 1832)	
298	*Plinthisus brevicollis* Ferrari, 1874	
299	*Plinthisus brevipennis* (Latreille, 1807)	
300	*Pterotmetus staphyliniformis* (Schilling, 1829)	
301	*Raglius alboacuminatus* (Goeze, 1778)	
302	*Raglius vulgaris* (Schilling, 1829)	
303	*Rhyparochromus phoenicaeus* (Rossi, 1794)	
304	*Rhyparochromus pini* (Linnaeus, 1758)	
305	*Scolopostethus thomsoni* Reuter, 1874	
306	*Stygnocoris fuligineus* (Geoffroy, 1785)	
307	*Trapezonotus dispar* (Stal, 1873)	
308	*Trapezonotus ullrichi* (Fieber, 1836)	
309	*Tropistethus holosericaeus* (Scholtz, 1846)	
310	*Xanthochilus quadratus* (Fabricius, 1798)	
311	*Dicranocephalus agilis* (Scopoli, 1763)	
312	*Dicranocephalus albipes* (Fabricius, 1781)	
313	*Dicranocephalus medius* (Mulsant & Rey, 1870)	
314	*Coreus marginatus* (Linnaeus, 1758)	
315	*Coriomeris scabricornis* (Panzer, 1809)	
316	*Enoplops scapha* (Fabricius, 1794)	
317	*Nemocoris falleni* R. Sahlberg, 1848	
318	*Spathocera dalmani* (Schilling, 1829)	
319	*Spathocera laticornis* (Schilling, 1829)	
320	*Spathocera lobata* (Herrich-Schaffer, 1840)	
321	*Syromastus rhombeus* (Linnaeus, 1767)	
322	*Ulmicola spinipes* (Fallen, 1807)	
323	*Alydus calcaratus* (Linnaeus, 1758)	
324	*Camptopus lateralis* (Germar, 1817)	
325	*Brachycarenus tigrinus* (Schilling, 1829)	
326	*Corizus hyoscyami* (Linnaeus, 1758)	

327	*Myrmus miriformis* (Fallen, 1807)	
328	*Rhopalus parumpunctatus* Schilling, 1829	
329	*Rhopalus subrufus* (Gmelin, 1788)	
330	*Stictopleurus abutilon* (Rossi, 1790)	
331	*Stictopleurus crassicornis* (Linnaeus, 1758)	
332	*Eurygaster maura* (Linnaeus, 1758)	
333	*Eurygaster testudinaria* (Geoffroy, 1785)	
334	*Aelia acuminata* (Linnaeus, 1758)	
335	*Aelia rostrata* Boheman, 1852	
336	*Aelia sibirica* Reuter, 1886	
337	*Antheminia lunulata* (Goeze, 1776)	
338	*Carpocoris fuscispinus* (Boheman, 1851)	
339	*Carpocoris melanocerus* (Mulsant & Rey, 1852)	
340	*Carpocoris purpureipennis* (De geer, 1773)	
341	*Dolycoris baccarum* (Linnaeus, 1758)	
342	*Eurydema oleraceum* (Linnaeus, 1758)	
343	*Eurydema ornatum* (Linnaeus, 1758)	
344	*Eysarcoris fabricii* Kirkaldy, 1904	
345	*Eysarcoris ventralis* (Westwood, 1837)	
346	*Graphosoma lineatum* (Linnaeus, 1758)	
347	*Holcostethus sphacelatus* (Fabricius, 1794)	
348	*Holcostethus strictus vernalis* (Wolff, 1804)	
349	*Neottiglossa leporina* (Herrich-Schaffer, 1830)	
350	*Neottiglossa pusilla* (Gmelin, 1789)	
351	*Palomena prasina* (Linnaeus, 1761)	
352	*Picromerus bidens* (Linnaeus, 1758)	
353	*Piezodorus lituratus* (Fabricius, 1794)	
354	*Rhacognathus punctatus* (Linnaeus, 1758)	
355	*Sciocoris cursitans* (Fabricius, 1794)	
356	*Sciocoris distinctus* Fieber, 1852	
357	*Sciocoris helferi* Fieber, 1852	
358	*Sciocoris microphthalmus* Flor, 1860	
359	*Sciocoris umbrinus* (Wolff, 1804)	
360	*Stagonomus pusillus* (Herrich-Schaffer, 1830)	
361	*Staria lunata* Hahn, 1835	
362	*Tholagmus flavolineatus* (Fabricius, 1798)	
363	*Trochiscocoris rotundatus* Horvath, 1895	
364	*Zicrona coerulea* (Linnaeus, 1758)	
365	*Elasmostethus interstinctus* (Linnaeus, 1758)	
366	*Elasmucha grisea* (Linnaeus, 1758)	
367	*Canthophorus dubius* (Scopoli, 1763)	
368	*Thyreocoris fulvipennis* (Dallas, 1851)	
369	*Thyreocoris scabricornis* (Linnaeus, 1758)	
370	*Tritomegas bicolor* (Linnaeus, 1758)	
371	*Coptosoma scutellatum* (Geoffroy, 1785)	
	Coleoptera Beetles	
372	*Agonum fuliginosum* (Panzer, 1809)	
373	*Agonum sexpunctatum* (Linnaeus, 1758)	
374	*Amara aenea* (Degeer, 1774)	

375	*Amara anthobia* Villa, 1833	
376	*Amara apricaria* (Paykull, 1790)	
377	*Amara bifrons* (Gyllenhal, 1810)	
378	*Amara convexior* Stephens, 1828	
379	*Amara curta* Dejean, 1828	
380	*Amara eurynota* (Panzer, 1797)	
381	*Amara familiaris* (Duftschmid, 1812)	
382	*Amara messae* Baliani, 1924	
383	*Amara nitida* Sturm, 1825	
384	*Amara ovata* (Fabricius, 1792)	
385	*Amara proxima* Putzeys, 1866	
386	*Amara tibialis* (Paykull, 1798)	
387	*Amara tricuspidata tricuspidata* Dejean, 1831	
388	*Anisodactylus binotatus* (Fabricius, 1787)	
389	*Anisodactylus nemorivagus* (Duftschmid, 1812)	
390	*Anisodactylus signatus* (Panzer, 1797)	
391	*Bembidion lampros* (Herbst, 1784)	
392	*Bembidion stephensi* Crotch, 1869	
393	*Bembidion subcostatum javurkovae* Fassati, 1944	
394	*Calathus fuscipes* (Goeze, 1777)	
395	*Calathus melanocephalus* (Linnaeus, 1758)	
396	*Calathus metallicus aeneus* Putzeys, 1873	
397	*Carabus coriaceus cerisyi* Dejean, 1826	
398	*Carabus hortensis* Linnaeus, 1758	
399	*Carabus montivagus bulgaricus* Csiki, 1927	
400	*Carabus violaceus azurescens* Dejean, 1826	
401	*Elaphropus diabrachys bismimaculatus* (Chevrolat, 1860)	
402	*Harpalus attenuates* Stephens, 1828	
403	*Harpalus quadripunctatus* Dejean, 1829	
404	*Laemostenus terricola punctatus* (Dejean, 1828)	
405	*Leistus rufomarginatus* Duftschmid, 1812	
406	*Molops alpestris rhilensis* Apfelbeck, 1904	
407	*Molops dilatatus dilatatus* Chaudoir, 1868	
408	*Molops rhodopensis rhodopensis* Apfelbeck, 1904	
409	*Nebria rufescens* (Stroem, 1768)	
410	*Notiophilus biguttatus* (Fabricius, 1779)	
411	*Ophonus cribricollis* (Dejean, 1829)	
412	*Ophonus puncticeps* Stephens, 1828	
413	*Ophonus schaubergerianus* Puel, 1937	
414	*Paranchus albipes* (Fabricius, 1796)	
415	*Platynus assimile* (Paykull, 1790)	
416	*Poecilus versicolor* (Sturm, 1824)	
417	*Pterostichus niger* (Schaller, 1783)	
418	*Pterostichus oblongopunctatus* (Fabricius, 1787)	
419	*Sinuchus vivalis* (Illiger, 1798)	
420	*Syntomus pallipes* (Dejean, 1825)	
421	*Tapinopterus balcanicus balcanicus* Ganglbauer, 1892	
422	*Trechus rhodopeius* Jeannel, 1921	
423	*Xenion ignitum* (Kraatz, 1875)	

424	*Zabrus rhodopensis* Apfelbeck, 1904	
425	*Phosphuga atrata* (Linnaeus, 1758)	
426	*Silpha obscura* Linnaeus, 1758	
427	*Lathrobium rectipennis* Raitschev, 1995	
428	*Helodes bulgharensis* Klausnitzer, 1980	
429	*Dorcus parallelipipedus* (Linnaeus, 1758)	
430	*Lucanus cervus* (Linnaeus, 1758)	
431	*Scarabaeus sacer* Linnaeus, 1758	
432	*Serica brunnea* (Linnaeus, 1758)	
433	*Anthaxia fulgurans* (Schrank, 1789)	
434	*Anthaxia helvetica* Stierlin, 1868	
435	*Buprestis rustica* Linnaeus, 1758	
436	*Capnodis tenebrionis* (Linnaeus, 1761)	
437	*Eurythyrea austriaca* (Linnaeus, 1767)	
438	*Ampedus trisris* (Linnaeus, 1758)	
439	*Athous monilicornis* Schwarz, 1897	
440	*Athous subfuscus* (Muller, 1767)	
441	*Dalopius marginatus* (Linnaeus, 1758)	
442	*Denticollis linearis* (Linnaeus, 1758)	
443	*Hypnoidus consobrinus* (Mulsant & Guillebeau, 1808)	
444	*Liotrychus affinis* (Paykull, 1800)	
445	*Coccinella septempunctata* Linnaeus, 1758	
446	*Coccinella quatuordecimpustulata* (Linnaeus, 1758)	
447	*Hyppodamia variegata* (Goeze, 1777)	
448	*Propylea quatuordecimpunctata* (Linnaeus, 1758)	
449	*Acmaeops septentrionis* C. Thomson, 1866	
450	*Evodinellus clathratus* (Fabricius, 1792)	
451	*Molorchus minor* (Linnaeus, 1758)	
452	*Monochamus sartor* (Fabricius, 1787)	
453	*Prionus coriarius* (Linnaeus, 1758)	
454	*Morimus funereus* Mulsant, 1863	
455	*Rhagium inquisitor* (Linnaeus, 1758)	
456	*Tetropium castaneum* (Linnaeus, 1758)	
457	*Xylosteus bartoni* Obenberger & Maran, 1933	
458	*Cryptocephalus sericeus* (Linnaeus, 1758)	
459	*Oreina variabilis balcanica* (Weise, 1883)	
460	*Otiorrhynchus hospitus* Reitter, 1912	
461	*Pissodes notatus* (Fabricius, 1787)	
462	*Dendroctonus micans* (Kugelanns, 1794)	
463	*Dryocoetes autographus* (Ratzeburg, 1837)	
464	*Hylastes cunicularius* Erichson, 1836	
465	*Hylurgops palliates* (Gyllenhal, 1813)	
466	*Ips amitinus* (Eichhoff, 1871)	
467	*Ips typographus* (Linnaeus, 1758)	
468	*Phloeophthorus rhododactylus* (Marsham, 1802)	
469	*Pityogenes chalcographus* (Linnaeus, 1761)	
470	*Pityophthorus exsculptus* (Ratzeburg, 1837)	
471	*Polygraphus polygraphus* (Linnaeus, 1758)	
472	*Polygraphus subopacus* Thomson, 1871	

473	*Xylechinus pilosus* (Ratzeburg, 1837)	
	Neuroptera Net-winged insects	
474	*Coniopteryx pygmaea* Enderlein, 1906	
475	*Coniopteryx tineiformis* Curtis, 1834	
476	*Conwentzia pineticola* Enderlein, 1906	
477	*Osmylus fulvicephalus* (Scopoli, 1763)	
478	*Hemerobius contumax* Tjeder, 1932	
479	*Hemerobius micans* Olivier, 1792	
480	*Hemerobius nutidulus* Fabricius, 1777	
481	*Hemerobius pini* Stephens, 1836	
482	*Hemerobius stigma* Stephens, 1836	
483	*Sympherobius fuscescens* (Wallengren, 1863)	
484	*Sympherobius pellucidus* (Walker, 1853)	
485	*Wesmaelius fassnidgei* (Killington, 1933)	
486	*Chrysopa nigricostata* Brauer, 1850	
487	*Cunctochrysa albolineata* (Killington, 1935)	
488	*Dichochrysa ventralis* (Curtis, 1834)	
489	*Macronemurus bilineatus* Brauer, 1868	
	Hymenoptera (Sawflies, Wasps, Bees, and Ants)	
490	*Ampulex fasciata* Jurine, 1806	
491	*Astata boops* (Schrank, 1781)	
492	*Bembix bidentata* Vander Linden, 1829	
493	*Bembix tarsata* Latereille, 1809	
494	*Cerceris rybyensis* (Linnaeus, 1771)	
495	*Crabro (Crabro) cribrarius* (Linnaeus, 1758)	
496	*Crabro (Crabro) peltatus* Fabricius, 1793	
497	*Diodontus luperus* Shuckard, 1837	
498	*Dolichurus corniculus* (Spinola, 1808)	
499	*Ectemnius (Clytochrysus) ruficornis* (Zetterstedt, 1838)	
500	*Ectemnius (Ectemnius) dives* (Lepeletier & Brulle, 1834)	
501	*Ectemnius (Metacrabro) cephalotes* (Olivier, 1792)	
502	*Entomognathus (Entomognathus) brevis* (Vander Linden, 1829)	
503	*Harpactus lunatus* (Dahlbom, 1832)	
504	*Oxybelus trispinosus* (Fabricius, 1787)	
505	*Podalonia hirsula* (Scopoli, 1763)	
506	*Spilomena beata* Bluthgen, 1953	
507	*Tachysphex nitidior* Beaumont, 1940	
508	*Tachysphex obscuripennis* (Schenk, 1857)	
509	*Chrysis ignita* (Linnaeus, 1758)	
510	*Camponotus (Camponotus) herculeanus* (Linnaeus, 1758)	
511	*Formica (Coptoformica) exsecta* Nylander, 1846	
512	*Formica (Formica) lugubris* Zetterstedt, 1840	
513	*Formica (Formica) pratensis* Retzius, 1783	
514	*Formica (Formica) rufa* Linnaeus, 1758	
515	*Formica (Raptiformica) sanguinea* Latereille, 1798	
516	*Formica (Serviformica) fusca* Linnaeus, 1758	
517	*Lasius (Dendrolasius) fuliginosus* (Latreille, 1798)	
518	*Manica rubida* (Latreille, 1802)	
519	*Myrmica ruginodis* Nylander, 1846	

520	*Tetramorium caespitum* (Linnaeus, 1758)	
521	*Myrmosa atra* Panzer, 1801	
522	*Smicromyrme (Smicromyrme) rufipes* (Fabricius, 1787)	
	Trichoptera Caddisflies	
523	*Rhyacophila armeniaca* Guerin-Meneville, 1843	
524	*Rhyacophila denticulifera* Kumanski, 1986	
525	*Rhyacophila loxias* Schmid, 1970	
526	*Rhyacophila obliterata* McLachlan, 1863	
527	*Rhyacophila polonica* McLachlan, 1879	
528	*Rhyacophila pseudotristis* Kumanski, 1987	
529	*Synagapetus iridipennis* McLachlan, 1879	
530	*Synagapetus montanus* Kumanski, 1985	
531	*Microptila minutissima* Ris, 1897	
532	*Philopotamus montanus* (Donovan, 1813)	
533	*Wormaldia occipitalis occipitalis* (Pictet, 1834)	
534	*Wormaldia pulla* (McLachlan, 1878)	
535	*Tinodes kimminsi* Sykora, 1962	
536	*Tinodes unidentatus* Klapalek, 1894	
537	*Plectrocnemia brevis* McLachlan, 1878	
538	*Hydropsyche tabacarui* Botosaneanu, 1960	
539	*Brachycentrus montanus* Klapalek, 1892	
540	*Micrasema minimum* McLachlan, 1876	
541	*Oligoplectrum maculatum* (Fourcroy, 1785)	
542	*Allogamus uncatus* (Brauer, 1857)	
543	*Annitella triloba* Marinkovic, 1955	
544	*Chaetopteryx stankovici* Marinkovic, 1966	
545	*Drusus botosaneanui* Kumanski, 1968	
546	*Drusus discolor* (Rambur, 1842)	
547	*Drusus discophorus pallidus* Kumanski, 1989	
548	*Ecclisopteryx dalecarlica* Kolenati, 1848	
549	*Halesus digitatus* (Schrank, 1781)	
550	*Limnephilus centralis* Curtis, 1834	
551	*Limnephilus sparsus* Curtis, 1834	
552	*Limnephilus vittatus* (Fabricius, 1798)	
553	*Potamophylax cingulatus* (Stephens, 1837)	
554	*Potamophylax latipennis* (Curtis, 1834)	
555	*Psilopteryx montanus* Kumanski, 1968	
556	*Crunoecia monospina* Botosaneanu, 1960	
557	*Thremma anomalum* McLachlan, 1876	
558	*Oecismus monedula* (Hagen, 1859)	
559	*Odontocerum hellenicum* Malicky, 1972	
	Lepidoptera Lepidopterans	
560	*Boloria pales rilaensis* Varga, 1971	
561	*Erebia cassioides macedonica* Buresch, 1918	
562	*Erebia euryale euryale* (Esper, 1805)	
563	*Erebia ottomana balcanica* Rebel, 1904	
564	*Erebia pronoe fruhstorferi* Warren, 1993	
565	*Issoria lathonia* (Linnaeus, 1758)	
566	*Dendrolimus pini* (Linnaeus, 1758)	

567	*Saturnia pyri* (Denis & Schiffermüller, 1775)	
568	*Parnassius apollo* Linnaeus, 1758	
569	*Gonepteryx rhamni* Linnaeus, 1758	
570	*Lycaena candens* (Herrich-Schäffer, 1844)	
571	*Polyommatus eroides* (Frivaldszky, 1835)	
572	*Apatura iris* (Linnaeus, 1758)	
573	*Limenitis populi* Linnaeus, 1758	
574	*Vanessa cardui* (Linnaeus, 1758)	
575	*Aglais io* (Linnaeus, 1758)	
576	*Euphydryas cynthia* (Denis & Schiffermüller, 1775)	
	Diptera True flies	
577	*Hybomitra tropica* (Linnaeus, 1758)	
578	*Conops (Conops) scutellatus* Meigen, 1804	
579	*Conops (Conops) silaceus* Wiedemann in Meigen, 1824	
580	*Chrysotoxum elegans* Loew, 1841	
581	*Chrysotoxum arcuatum* (Linnaeus, 1758)	
582	*Chrysotoxum fasciolatum* (De Geer, 1776)	
583	*Chrysotoxum intermedium* Meigen, 1822	
584	*Epistrophe (Epistrophella) euchroma* (Kowarz, 1885)	
585	*Lejogaster splendida* (Meigen, 1822)	
586	*Merodon (Merodon) loewi* Van der Goot, 1964	
587	*Merodon (Merodon) testaceus* Sack, 1913	
588	*Orthonevra geniculata* (Meigen, 1830)	
589	*Platycheirus peltatus* (Meigen, 1822)	
590	*Psilota anthracina* Meigen, 1822	
591	*Rhingia rostrata* (Linnaeus, 1758)	
592	*Opomyza florum* (Fabricius, 1794)	
593	*Hydrellia griseola* (Fallen, 1813)	
594	*Notiphila annulipes* (Stenhammar, 1844)	
595	*Notiphila nigricornis* Stenhammar, 1844	
596	*Parydra coarctata* (Fallen, 1813)	
597	*Parydra cognata* Loew, 1860	
598	*Parydra qudripunctata* (Meigen, 1830)	
599	*Philigria stictica* (Meigen, 1830)	
600	*Psilopa nitidula* (Fallen, 1813)	
601	*Psilopa polta* (Macquart, 1835)	
602	*Scatella stagnalis* (Fallen, 1813)	
603	*Scatella paludum* (Meigen, 1830)	
604	*Conioscinella frontella* (Fallen, 1820)	
605	*Elachiptera cornuta* (Fallen, 1820)	
606	*Meromyza femorata* Macquart, 1835	
607	*Meromyza pratorum* Meigen, 1830	
608	*Meromyza rufa* Fedoseeva, 1962	
609	*Meromyza saltatrix* (Linnaeus, 1761)	
610	*Meromyza variegata* Meigen, 1830	
611	*Oscinimorpha sordidissima* (Strobl, 1900)	
612	*Thaumatomyia glaba* (Meigen, 1830)	
613	*Thaumatomyia notata* (Meigen, 1830)	
614	*Trachysiphonell ruficeps* (Macquart, 1838)	

615	*Pollenia pallida* Rohdendorf, 1926	
616	*Helicophagella noverca* (Rondani, 1869)	
617	*Heteronichia (Eupierretia) schineri* (Bezi, 1891)	
618	*Heteronichia (Heteronichia) benaci* (Bottcher, 1913)	
619	*Heteronichia (Eupierretia) vagans* (Meigen, 1826)	
620	*Heteronichia (Heteronichia) dissimilis* (Meigen, 1826)	
621	*Metopia (Anicia) campestris* (Fallen, 1820)	
622	*Metopia (Metopia) agryrocephala* (Meigen, 1824)	
623	*Robineauella (Robineauella) scoparis* (Pandalle, 1896)	
624	*Winthemia quadripustulata* (Fabricius, 1794)	
	Mollusca Mollusks Gastropoda Gastropods	
625	*Arion subfuscus* (Draparnaud, 1805)	
626	*Tandonia budapestensis* (Hazay, 1881)	
627	*Lehmannia nyctelia* (Bourguignat, 1861)	
628	*Limax cinereoniger* Wolf, 1803	
629	*Limax macedonicus* Hesse, 1928	
630	*Deroceras turcicum* (Simroth, 1894)	
631	*Helix pomatia* Linnaeus, 1758	
632	*Helicella obvia* (Hartmann, 1844)	

List of fish species in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Cypriniformes	
1	*Oxynoemacheilus bureschi* (Drensky, 1928) Struma stone loach	VU
2	*Leuciscus cephalus* (Linnaeus, 1758) European chub	
3	*Chondrostoma nasus* (Linnaeus, 1758) Common nase	
4	*Barbus cyclolepis* Heckel, 1837 Round-scaled barbel	
	Perciformes	
5	*Lepomis gibbosus* (Linnaeus, 1758) Pumpkinseed	
	Salmoniformes	
6	*Salmo trutta fario* Linnaeus, 1758 Brown trout	

List of amphibian species in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Caudata	
1	*Lissotriton vulgaris* (Linnaeus, 1758) Smooth Newt	
2	*Triturus ivanbureschi* Arntzen & Wielstra, 2013 Buresch`s Crested Newt	
3	*Salamandra salamandra* (Linnaeus, 1758) Fire Salamander	
	Anura	
4	*Bombina variegata* (Linnaeus, 1758) Yellow-bellied Toad	
5	*Bufo bufo* (Linnaeus, 1758) Common Toad	
6	*Bufotes viridis* complex Green Toad	
7	*Hyla arborea* (Linnaeus, 1758) Common Tree Frog	
8	*Rana temporaria* Linnaeus, 1758 Common Frog	

9	*Rana dalmatina* Fitzinger *in* Bonaparte, 1838 Agile Frog	
10	*Rana graeca* Boulenger, 1891 Balkan Stream Frog	
11	*Pelophylax ridibundus* (Pallas, 1771) Marsh Frog	

List of reptiles species in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Testudines	
1	*Testudo hermanni* Gmelin, 1789 Hermann's Tortoise	EN
2	*Testudo graeca* Linnaeus, 1758 Spur-thighed Tortoise	EN
3	*Emys orbicularis* (Linnaeus, 1758) European Pond Terrapin	
4	*Trachemys scripta* (Thunberg *in* Schoepff, 1792) Pond Slider	
	Sauria	
5	*Mediodactylus kotschyi* (Steindachner, 1870) Kotschy's Gecko	
6	*Lacerta viridis* (Laurenti, 1768) Eastern Green Lizard	
7	*Lacerta agilis Linnaeus, 1758* Sand Lizard	
8	*Zootoca vivipara* (Lichtenstein, 1823) Viviparous Lizard	
9	*Podarcis erhardii* (Bedriaga, 1882) Erhard's Wall Lizard	
10	*Podarcis tauricus* (Pallas, 1814) Balkan Wall Lizard	
11	*Podarcis muralis* (Laurenti, 1768) Common Wall Lizard	
12	*Ablepharus kitaibelii* (Bibron & Bory de Saint-Vincent, 1833) Snake-eyed Skink	
13	*Anguis fragilis* Linnaeus, 1758 Slow Worm	
	Serpentes	
14	*Natrix natrix* (Linnaeus, 1758) Grass Snake	
15	*Natrix tessellata* (Laurenti, 1768) Dice Snake	
16	*Dolichophis caspius* (Gmelin, 1789) Caspian Whip Snake	
17	*Platyceps najadum* (Eichwald, 1831) Dahl's Whip Snake	
18	*Zamenis longissimus* (Laurenti, 1768) Aesculapian Snake	
19	*Coronella austriaca* Laurenti, 1768 Smooth Snake	
20	*Vipera berus* (Linnaeus, 1758) Adder	
21	*Vipera ammodytes* (Linnaeus, 1758) Nose-horned Viper	

List of bird species in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Galliformes	
1	*Bonasa bonasia* (Linnaeus, 1758) Hazel grouse	
2	*Tetrao urogallus* Linnaeus, 1758 Western capercaillie	EN
3	*Alectoris graeca* (Meisner, 1804) Rock partridge	EN
4	*Perdix perdix* (Linnaeus, 1758) Perdix	
5	*Coturnix coturnix* Linnaeus, 1758 Common quail	
	Ciconiiformes	
6	*Ixobrychus minutus* (Linnaeus, 1766) Common little bittern	EN
7	*Ciconia ciconia* (Linnaeus, 1758) White stork	VU
	Falconiformes	
8	*Falco naumanni* Fleischer, 1818 Lesser kestrel	CR

9	*Falco tinnunculus* Linnaeus, 1758 Common kestrel	
10	*Falco peregrinus* Tunstall, 1771 Peregrine falcon	
11	*Accipiter gentilis* Linnaeus, 1758 Northern goshawk	EN
12	*Accipiter nisus* Linnaeus, 1758 Eurasian sparrowhawk	
13	*Buteo buteo* (Linnaeus, 1758) Common buzzard	
14	*Circaetus gallicus* Gmelin, 1788 Short-toed snake eagle	VU
15	*Circus pygargus* Linnaeus, 1758 Montagu's harrier	VU
	Gruiformes	
16	*Crex crex* (Linnaeus, 1776) Corn crake	VU
17	*Fulica atra* Linnaeus, 1758 Eurasian coot	
	Charadriiformes	
18	*Burhinus oedicnemus* (Linnaeus, 1758) Eurasian stone curlew	VU
19	*Charadrius dubius* Scopoli, 1786 Little ringed plover	VU
	Columbiformes	
20	*Columba livia* Gmelin, 1789 Rock pigeon	
21	*Columba oenas* Linnaeus, 1758 Stock dove	EN
22	*Columba palumbus* Linnaeus, 1758 Common wood pigeon	
23	*Streptopelia turtur* (Linnaeus, 1758) European turtle dove	
24	*Streptopelia decaocto* (Frivaldszky, 1838) Eurasian collared dove	
	Strigiformes	
25	*Bubo bubo* (Linnaeus, 1758) Eurasian eagle-owl	EN
26	*Strix aluco* Linnaeus, 1758 Tawny owl	
27	*Glaucidium passerinum* (Linnaeus, 1758) Eurasian pygmy owl	EN
28	*Athene noctua* (Scopoli, 1769) Little owl	
29	*Aegolius funereus* Linnaeus, 1758 Boreal owl	VU
	Piciformes	
30	*Picus canus* Gmelin, 1788 Grey-headed woodpecker	EN
31	*Picus viridis* Linnaeus, 1758 European green woodpecker	
32	*Dendrocopos leucotos lilfordi* (Sharp & Dresser, 1871) White-backed woodpecker	EN
33	*Picoides tridactylus* (Linnaeus, 1758) Three-toed woodpecker	EN
34	*Dendrocopos major* Linnaeus, 1758 Great spotted woodpecker	
35	*Dryocopus martius* (Linnaeus, 1758) Black woodpecker	VU
	Passeriformes	
36	*Eremophila alpestris balcanica* (Reichenow, 1895) Horned lark	VU
37	*Ptyonoprogne rupestris* Scopoli, 1769 Eurasian crag martin	
38	*Hirundo rustica* Linnaeus, 1758 Barn swallow	
39	*Hirundo daurica* (Temminck, 1835) Red-rumped swallow	
40	*Delichon urbica* (Linnaeus, 1758) Common house martin	
41	*Anthus trivialis* (Linnaeus, 1758) Tree pipit	
42	*Anthus spinoletta* (Linnaeus, 1758) Water pipit	
43	*Motacilla cinerea* Tunstall, 1771 Grey wagtail	
44	*Motacilla alba* Linnaeus, 1758 White wagtail	
45	*Troglodytes troglodytes* (Linnaeus, 1758) Eurasian wren	
46	*Cinclus cinclus* (Linnaeus, 1758) White-throated dipper	
47	*Prunella modularis* (Linnaeus, 1758) Dunnock	
48	*Prunella collaris* (Scopoli, 1769) Alpine accentor	VU
49	*Erithacus rubecula* (Linnaeus, 1758) European robin	
50	*Phoenicurus ochrurus* (Linnaeus, 1758) Redstart	
51	*Saxicola rubetra* (Linnaeus, 1758) Whinchat	

52	*Oenanthe oenanthe* (Linnaeus, 1758) Northern wheatear	
53	*Turdus torquatus* Linnaeus, 1758 Ring ouzel	
54	*Turdus merula* Linnaeus, 1758 Common blackbird	
55	*Turdus philomelos* Brehm, 1831 Song thrush	
56	*Turdus viscivorus* Linnaeus, 1758 Mistle thrush	
57	*Sylvia atricapilla* (Linnaeus, 1758) Eurasian blackcap	
58	*Sylvia hortensis* (Gmelin, 1789) Western Orphean warbler	VU
59	*Phylloscopus collybita* (Vieillot, 1817) Common chiffchaff	
60	*Regulus regulus* (Linnaeus, 1758) Goldcrest	
61	*Regulus ignicapillus* (Temminck, 1820) Common firecrest	
62	*Aegithalos caudatus* (Linnaeus, 1758) Long-tailed bushtit	
63	*Poecile palustris* (Linnaeus, 1758) Marsh tit	
64	*Poecile montanus* (Baldenstein, 1827) Willow tit	
65	*Periparus ater* (Linnaeus, 1758) Coal tit	
66	*Cyanistes caeruleus* (Linnaeus, 1758) Eurasian blue tit	
67	*Parus major* Linnaeus, 1758 Great tit	
68	*Sitta europaea* (Linnaeus, 1758) Eurasian nuthatch	
69	*Sitta neumayer* Michahellis, 1830 Western rock nuthatch	VU
70	*Tichodroma muraria* (Linnaeus, 1758) Wallcreeper	VU
71	*Certhia familiaris* Linnaeus, 1758 Eurasian treecreeper	
72	*Garrulus glandarius* (Linnaeus, 1758) Eurasian jay	
73	*Pica pica* (Linnaeus, 1758) Eurasian magpie	
74	*Nucifraga caryocatactes* (Linnaeus, 1758) Spotted nutcracker	
75	*Pyrrhocorax graculus* Linnaeus, 1766 Alpine chough	VU
76	*Corvus corone cornix* Linnaeus, 1758 Hooded crow	
77	*Coloeus monedula* (Linnaeus, 1758) Western jackdaw	
78	*Corvus corax* Linnaeus, 1758 Common raven	
79	*Serinus serinus* (Linnaeus, 1766) European serin	
80	*Carduelis chloris* (Linnaeus, 1758) European greenfinch	
81	*Carduelis carduelis* (Linnaeus, 1758) European goldfinch	
82	*Spinus spinus* (Linnaeus, 1758) Eurasian siskin	VU
83	*Acanthis cannabina* (Linnaeus, 1758) Common linnet	
84	*Loxia curvirostra* Linnaeus, 1758 Red crossbill	
85	*Pyrrhula pyrrhula* (Linnaeus, 1758) Eurasian bullfinch	
86	*Coccothraustes coccothraustes* (Linnaeus, 1758) Hawfinch	
87	*Emberiza citrinella* Linnaeus, 1758 Yellowhammer	
88	*Sturnus vulgaris* Linnaeus, 1758 Common starling	
89	*Oriolus oriolus* (Linnaeus, 1758) Eurasian golden oriole	
90	*Passer domesticus* (Linnaeus, 1758) House sparrow	
91	*Passer montanus* (Linnaeus, 1758) Eurasian tree sparrow	
92	*Fringilla coelebs* Linnaeus, 1758 Common chaffinch	

List of mammal species in Blagoevgradska Bistritsa river basin

#	Species (Latin/English name)	RDB
	Insectivora	
1	*Erinaceus concolor* (Martin, 1838) Eastern Hedgehog	

2	*Talpa europaea* Linnaeus, 1758 Common Mole	
3	*Sorex araneus* Linnaeus, 1758 Common Shrew	
4	*Sorex minutus* Linnaeus, 1766 Pygmy Shrew	
5	*Neomys fodiens* (Pennant, 1771) Water Shrew	
6	*Crocidura leucodon* (Hermann, 1780) Bicoloured White-toothed Shrew	
	Chiroptera	
7	*Myotis blythi* (Tomes, 1857) Lesser Mouse-eared Bat	
8	*Myotis mystacinus* (Kuhl, 1817) Whiskered Bat	
9	*Rhinolophus ferrumequinum* (Schreber, 1774) Greater Horseshoe	
10	*Rhinolophus hipposideros* (Bechstein, 1800) Lesser Horseshoe	
11	*Plecotus auritus* (Linnaeus, 1758) Brown Long-eared Bat	
12	*Pipistrellus pipistrellus* (Schreber, 1774) Common Pipistrelle	
13	*Pipistrellus kuhlii* (Kuhl, 1817) Kuhl`s Pipistrelle	
	Lagomorpha	
14	*Lepus capensis* Linnaeus, 1758 Brown Hare	
	Rodentia	
15	*Sciurus vulgaris* Linnaeus, 1758 Red Squirrel	
16	*Dryomys nitedula* (Pallas, 1778) Forest Dormouse	
17	*Glis glis* (Linnaeus, 1766) Fat Dormouse	
18	*Muscardinus avellanarius* (Linnaeus, 1758) Common Dormouse	
19	*Sylvaemus flavicollis* (Melchior, 1834) Yellow-necked Mouse	
20	*Sylvaemus sylvaticus* (Linnaeus, 1758) Wood Mouse	
21	*Rattus rattus* (Linnaeus, 1758) Black Rat	
22	*Rattus norvegicus* (Berkenhout, 1769) Common Rat	
23	*Mus musculus* Linnaeus, 1758 House Mouse	
24	*Clethrionomys glareolus* (Schreber, 1780) Bank Vole	
25	*Arvicola terrestris* (Linnaeus, 1758) Water Vole	
26	*Microtus arvalis* (Pallas, 1778) Common Vole	
27	*Microtus subterraneus* (de Selys-Longchamps, 1836) Common Pine Vole	
28	*Nannospalax leucodon* (Nordmann, 1840) Lesser Mole Rat	
	Carnivora	
29	*Ursus arctos* Linnaeus, 1758 Brown Bear	EN
30	*Lynx lynx* (Linnaeus, 1758) Lynx	CR
31	*Felis silvestris* Schreber, 1777 Wildcat	EN
32	*Canis lupus* Linnaeus, 1758 Wolf	VU
33	*Canis aureus* Linnaeus, 1758 Golden Jackal	
34	*Vulpes vulpes* (Linnaeus, 1758) Red Fox	
35	*Meles meles* (Linnaeus, 1758) Badger	
36	*Lutra lutra* Linnaeus, 1758 Common Otter	VU
37	*Mustela nivalis* Linnaeus, 1766 Weasel	
38	*Mustela putorius* Linnaeus, 1758 Western Polecat	
39	*Martes martes* (Linnaeus, 1758) Pine Marten	EN
40	*Martes foina* (Erxleben, 1777) Beech Marten	
	Artiodactyla	
41	*Sus scrofa* Linnaeus, 1758 Wild Boar	
42	*Capreolus capreolus* (Linnaeus, 1758) Roe Deer	
43	*Cervus elaphus* Linnaeus, 1758 Red Deer	
44	*Rupicapra rupicapra* (Linnaeus, 1789) Chamois	EN