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EVALUATION OF NATURAL CONDITIONS AND RESOURCES OF BLAGOEVGRAD FOR THE NEEDS OF GENERAL PLAN FOR DEVELOPMENT OF THE CITY

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Abstract

The present work provides an overview of the local natural potential in the region of Blagoevgrad, as well as an assessment of its practical importance for urban planning purposes. It is of major importance to develop the urban territory in such a manner as to ensure optimum use of the local natural conditions and resources. It is also important to ensure living spaces with adequate bioclimatic parameters in terms of reducing the effect of the more frequently occurring extreme climate events on people. The results from the study are useful for optimization of territorial structure of the town as well as of the governing activity in the town, in the context of sustainable nature usage.

***Key words**: nature conditions and resources; town of Blagoevgrad; plan for city development*

Introduction

The planning of urban areas is an important issue, associated with the provision of optimum conditions for personal and public life. These conditions depend on a number of factors, including the natural potential of the territory. The significance of this factor has grown especially in the recent years, when climate change is aggravated and natural resources are increasingly exhausted. Under these complicated circumstances the problem with planning of urban areas acquires still greater importance. This ensues, on the one hand, from the need to ensure living spaces with adequate bioclimatic parameters in terms of reducing the effect of the more frequently occurring extreme climate events on people. On the other hand, it is of major importance to develop the urban territory in such a manner as to ensure optimum use of the local natural conditions and resources. Hence comprehensive consideration of their potential and planning of their balanced utilization, as well as adequate territorial localization of the relevant activities, are necessary. In this context the present work provides an overview of the local natural potential in the region of Blagoevgrad, as well as an assessment of its practical importance for urban planning purposes[1].

[1] Z. Mateeva is the author of the chapter “Natural Conditions and Resources” in the frame of Programme for the Development of an Assignment and General Development Plan (GDP) of Blagoevgrad.

1. Geographical position

Location, extent and boundaries

Blagoevgrad is situated in the foot of the southwestern slopes of the Rila Mt., in the valley of the Struma River and its tributary Blagoevgradska Bistritsa. The city comprises the quarters Gramada, residential complexes Zapad, Elenovo, Alen Mak and Strumsko, encompassing the central urban area, as well as the park territories of the central city park, the Skaptopara park, the Alen Mak forest park, the Natural Science Complex and the Bachinovo park (Fig. 1). The city is located in the middle of the territory of the homonymous municipality, situated in the northwest part of the Blagoevgrad district and in the west part of the South-West Planning Region (Fig. 2). The land of the town spreads to the settlements Riltsi, Belo Pole, Balgarevo, Zelen Dol, Pokrovnik, Moshanets, Aydarovo, Elenovo, Delvino and Dabrava, all of them being of rural type, inhabited by only 7 % of the municipal population, while the major part of the district population (93 %) belongs to Blagoevgrad.

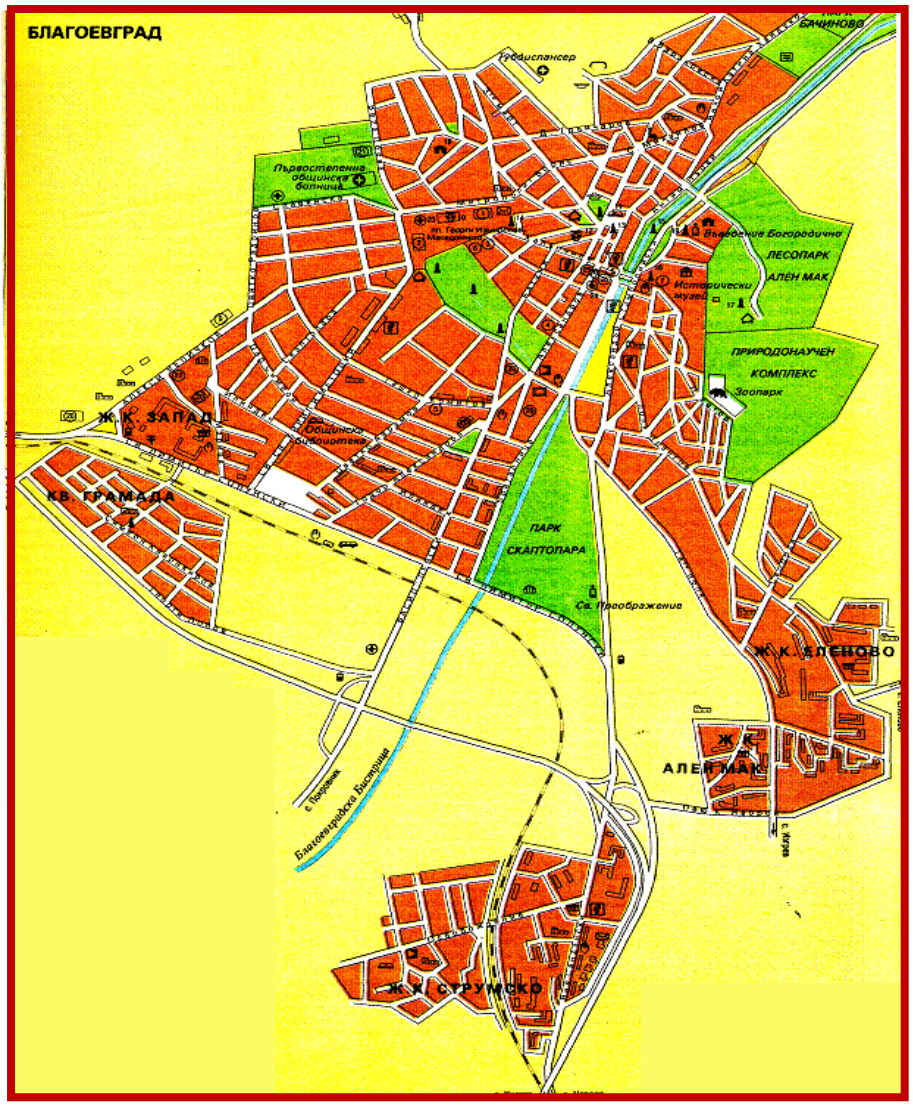

Fig. 1. Scheme of a town of Blagoevgrad

The present town was built at the place of the ancient settlement of Skaptopara, existing 3000 years B.C. The origin of the town was in the time of Turkish rule and it was mentioned for the first time in a Turkish document in 1592 under the name of Gorna Dzhumaya (Upper Marketplace).

The region of Blagoevgrad, established under the Regional Development Act as a "region for development" borders a "region in industrial decline" (Simitli municipality) and another "poor rural region" (Nevestino). The rest of the regions (the municipalities Kocherinovo, Rila, Razlog and Kresna) adjacent to the Blagoevgrad area are defined as "territories outside the regions of targeted impact" (Fig. 2).

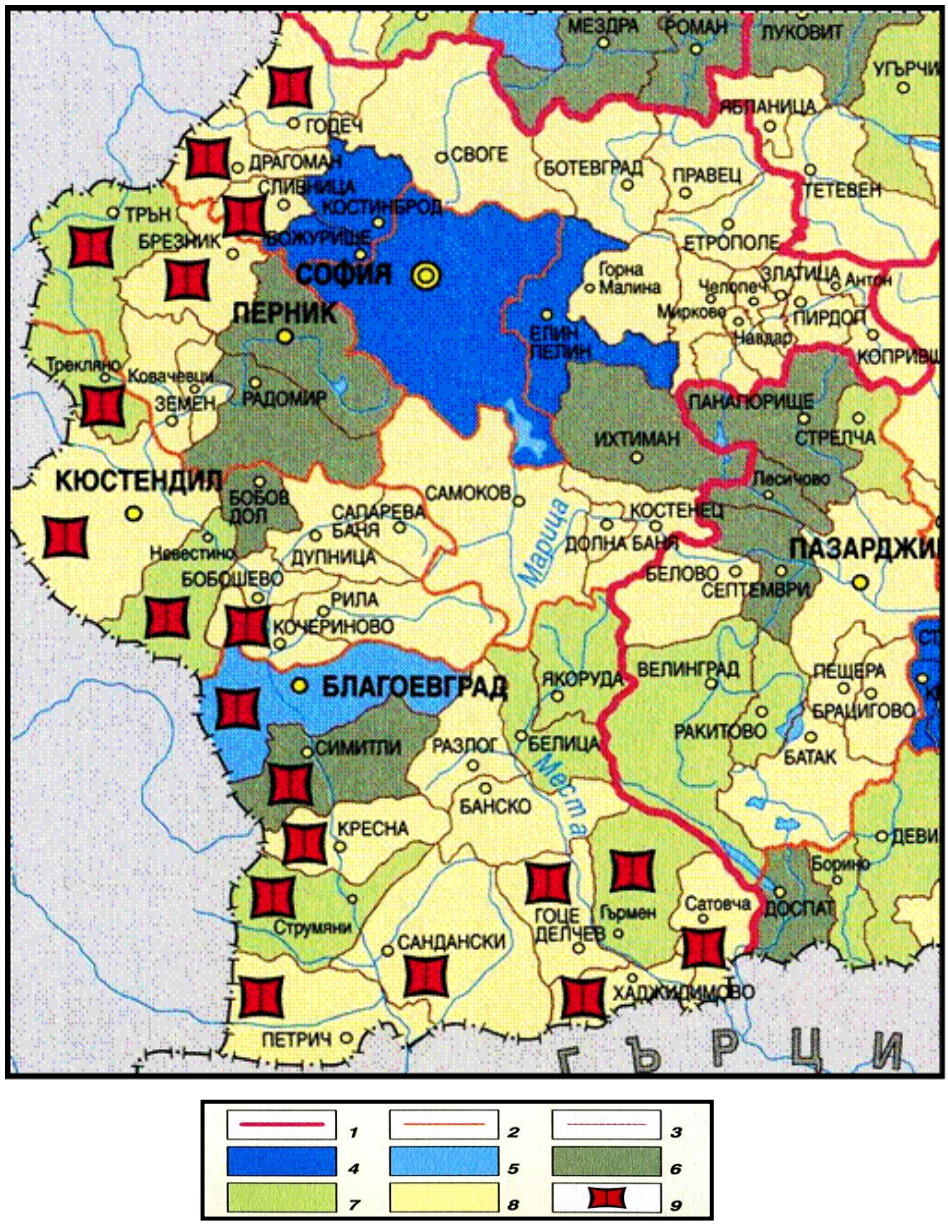

Fig.2.Planning regions and regions of targeted impact in the Blagoevgrad district (after [11])

1 – boundary of planning region; 2 – boundary of district; boundary of municipality; 4 – regions of economic growth; 5 – regions for development; 6 - regions in industrial decline; 7 – poor rural regions; 8 – territories outside the regions of targeted impact; 9 – regions of transborder cooperation.

Transport-communication position

Blagoevgrad is situated at the main road E-79, as well as at a railway line, both being of international importance. The city is located at a distance of 100 km to the south from the capital Sofia, 20 km from the Republic of Macedonia, 100 km from the Republic of Greece and 250 km from the port city of Solun. Blagoevgrad is a regional center of the National Telecommunication Company and of the Bulgarian National Television and Radio. The 400-kV alignment of the National Electric Power Transfer Network and the Struma gas pipeline pass via Blagoevgrad, ensuring possibilities for export to Greece of electric power and gas respectively.

2. Natural potential

Geology, geodynamics, morphography

The region of Blagoevgrad is situated in the Blagoevgrad (Dzherman) graben, with main direction of spreading north-south. The geological substrate of the area is built of alluvial-proluvial-deluvial deposits, as well as of Upper Miocene and Pliocene marine and brackish sediments, bordering with Pre-Cambrian metamorphic complexes. In morphostructural respect the region is a Young Paleogene and Neogene kettle depression at the boundary with the Macedonian-Rhodope horst massif. The depression is situated between three faults – to the north, south and east. The contemporary vertical crustal movements are very slightly pronounced, in the direction towards sinking. The potential shakeability of the city territory is of the maximum IX degree according to the scale of Medvedev-Sponheuer-Karnik. The gravitational phenomena and processes are manifested in the form of shallow landslides. With respect to the erosion processes (according to the parameters of the floating debris runoff), their display is moderately strong along the mountain slopes – between 151 and 500 t/ave.ann./km2, while the kettle represents a zone of accumulation.

Blagoevgrad is situated on the border between the Sredna Struma and Rila-Pirin physical-geographic areas. It is located in the Blagoevgrad kettle, at the foot of the southwest surrounding branches of Rila, between the Dabrava and Delvino ridges (Fig. 3). The kettle was formed during the Neogene by deep sinking of its bottom along a system of fault lines in the southern part of the Blagoevgrad graben. It has well outlined encircling slopes, coinciding with hillside slopes along faults, which renders them angular outlook. The degree of morphographic markedness of the kettle bottom is closely related to the character of the rocks filling it, the relatively well-defined base and the alluvial extensions and talus fans. Hypsometrically the area of the urban territory varies between an altitude of 200 and 600 m, the average being about 400 m (Fig. 4).

The main relief elements are valley-planar forms and mountain slopes. The natural landscape has undergone anthropogenic alterations and there is certain technogenic loading by quarries for aggregate and ballast materials.

The assessment of the geological-geomorphological conditions for the purposes of GDP requires zoning of the urban area according to the following indicators: geological substrate, degree of dismemberment, gradient, absolute and relative height, exposure, seismicity,

contemporary geodynamic processes. It is necessary to determine the most favourable/ unfavourable regions from geomorphological viewpoint for urban construction (industrial, engineering, civil), agricultural, forestry, recreation and environment protection activities. The main sources of information are: topographic, aerial, satellite, geomorphological and geological images.

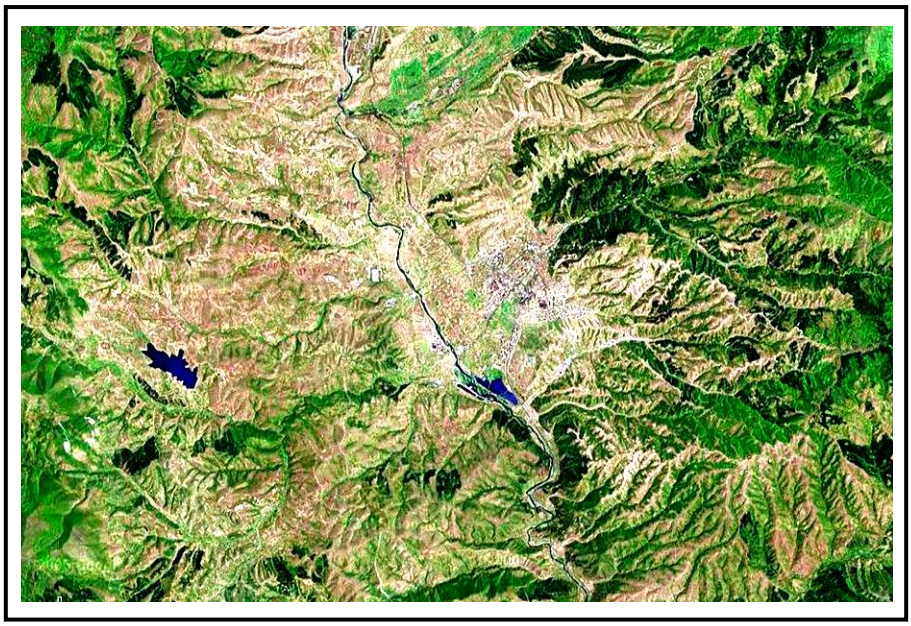

Fig. 3. Satellite image of the Blagoevgrad kettle

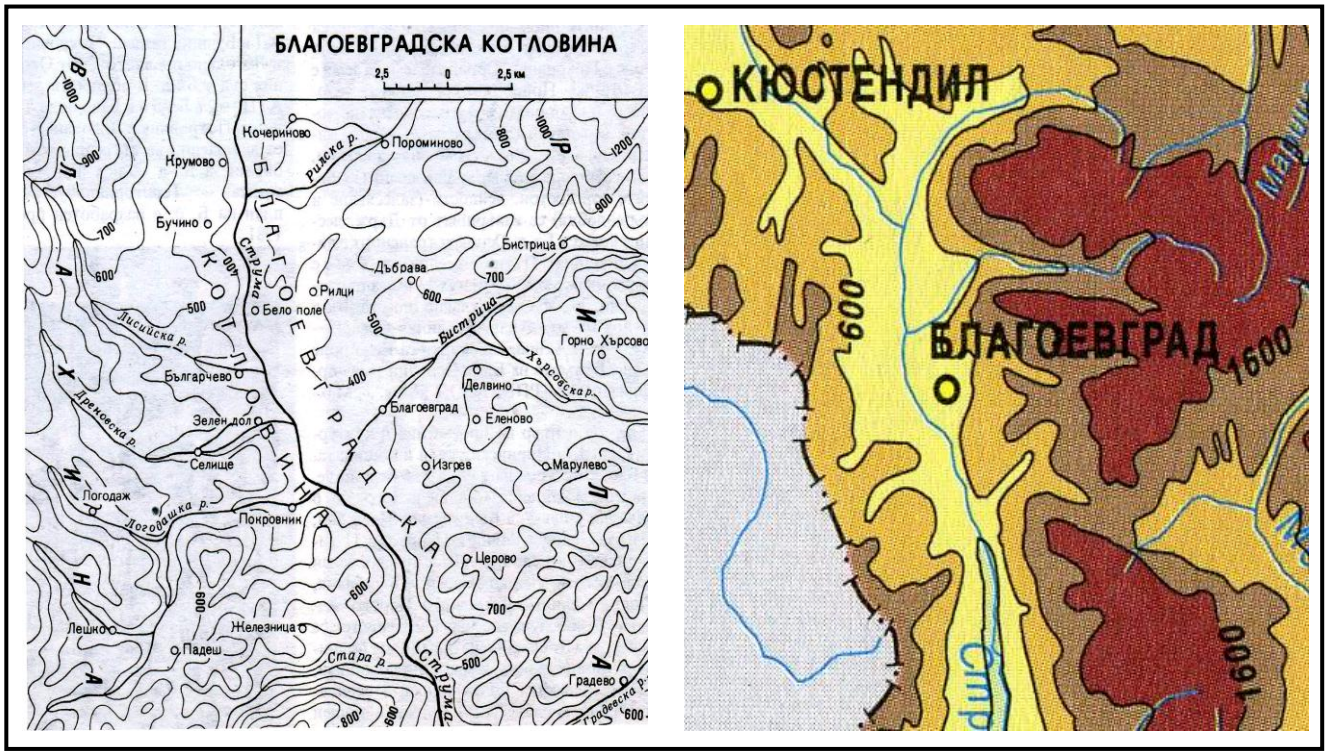

Fig. 4. Hypsometric schemes of the Blagoevgrad kettle (after [16; 17])

Climate

Two climate sub-regions of the Continental-Mediterranean climate region in Bulgaria are distinguished in Blagoevgrad – Dolna Struma and Southern-Rila. An important climate factor are the local physical-geographic features, determining the specific influence of the mountain and the kettle – as relief factors, on the local climate, while the Mediterranean influence is transferred along the Struma River valley.

The average annual temperature of the air at the Blagoevgrad meteorological station (MS) is 12,4^0 C. The average temperature of the coldest month – January, in MS is 0,5^0 C (abs.min. -25,2^0 C), determined by the positive radiation balance (0,19 kcal/cm2) in the region during this month, while the average temperature of the warmest month – July, is 23,0^0 C (abs.max. 41,6^0 C) (Fig. 5). This determines the winter as mild, and the summer – as very warm, with respect to the possibilities for activities in the open. The annual number of bright days is significant – 94 days, which is an important parameter for urban construction activities. At the background of the average monthly values of the temperature of the air above 0^0 C almost all the year round, the periods with transition of the temperature above 5, 10 and 15^0 C are relatively long – respectively 275, 212 and 155 days, which is of high bioclimatic importance for the different economic activities of people in the open. The annual precipitation sum is 560 mm, with seasonal distribution of a transient type – two maximums (late spring and late autumn) and two minimums – summer and late winter/early spring. The difference between the amount of precipitation and evaporation is significant – between -300 and -400 mm, which determines the low soil moisture during the summer period. The average number of days with snow cover retention is low – 4 in December, 8 in January and 5 in February.

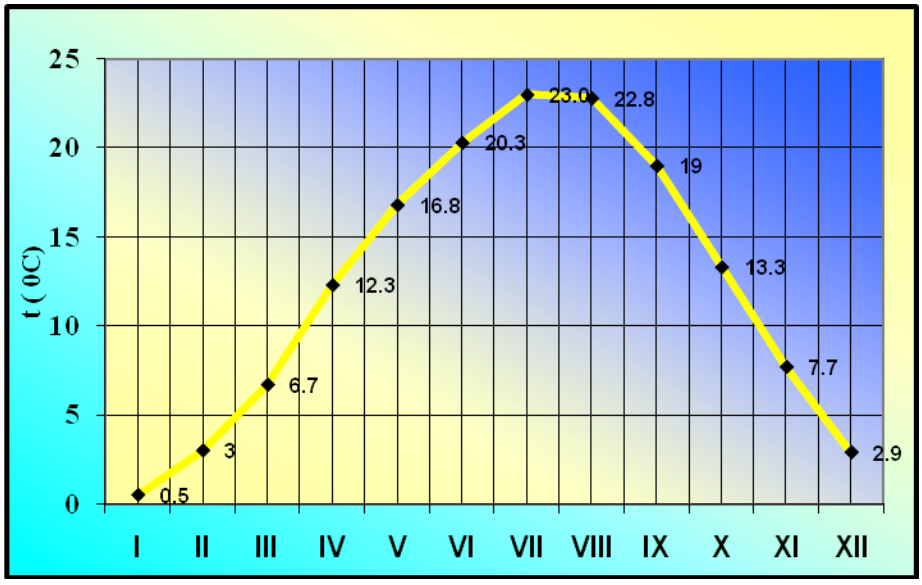

Fig. 5. Annual course of air temperature (t)

The predominant winds are from the north (26%), but the share of southern winds is also significant (19%) (Fig. 6), which is important for the disposition of the residential and industrial quarters in the city. The average annual wind velocity at the meteorological station is rather low –

1,0 m/s. The percentage of calm weather here is considerable (42,8%), which is a prerequisite for reduced serf-purifying capacity of the atmosphere. The wind velocity with maximum probability (95%) is also rather low – 0,3 m/s on the average, and the maximum wind velocity, observed at least once in the year, is only 16 m/s, which is favourable for conducting construction activities in the open, but is not a good parameter in terms of wind power generation.

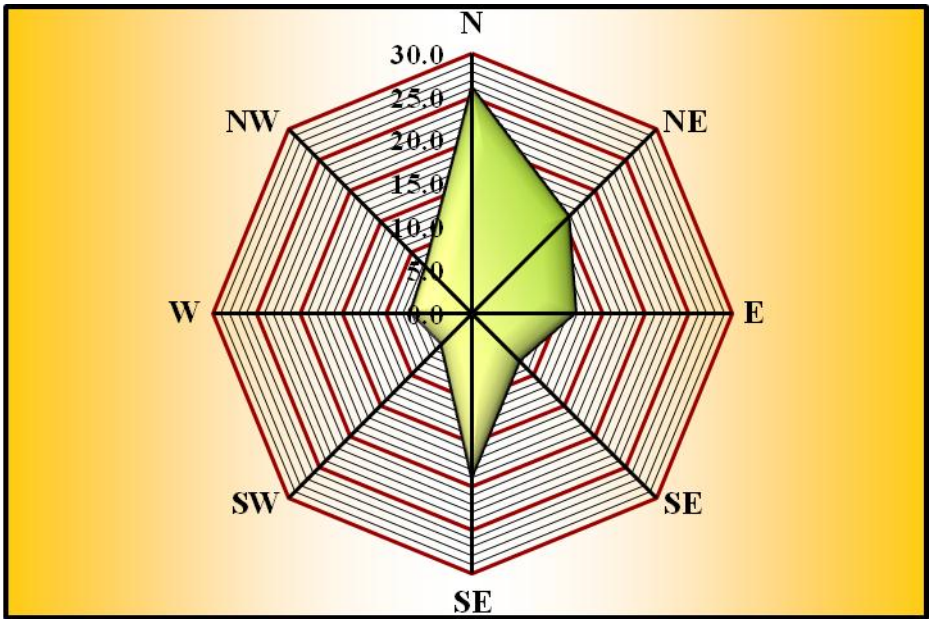

Fig.6. Annual wind rose by direction (%)

The assessment of climatic conditions for the purposes of GDP requires zoning of the urban territory according to the degree of appropriateness for the functions of construction, agriculture, recreation, etc. The climatic conditions for construction purposes are evaluated by indicators as: frequency of temperature transition across 0^0C, wind direction and velocity, maximum and minimum temperature of the air, presence and character of temperature inversions, seasonality and intensity of precipitation, relative and absolute humidity of the air, etc. The agroclimatic assessment requires characterization of heat and moisture provision, taking into account the extreme weather events. The physiological-climatic conditions are evaluated using the human biocomfort indicators. It is expedient to use for GDP the methodology of sanitary- and recreation-climatic zoning of the territory. The basic information sources are the archives of the hydro-meteorological services, as well as data from local field observations for the purposes of the relevant practical activities.

Water

The main drainage artery of the region of Blagoevgrad is the Struma River with its left tributary Blagoevgradska Bistritsa, as well as the tributaries of the latter – the rivers Slavova, Harsovska and Kovatchitsa. These rivers are respectively of the fifth, third and second rank with respect to the general classification scheme of the river network in Bulgaria, categorizing the river valleys from 1st to 7th rank. The elementary river valleys are referred to the 1st rank, and each following type is obtained by the merging of two valleys of the same rank. The river

network is entirely in the Aegean runoff basin, and with respect to the climate impact on runoff – to the moderate-continental hydrological zone. The rivers are characterized by manifestation of transient features of runoff, expressed secondary autumn-winter high water, but the major maximum is in spring under the effect of the snow-thaw water recharge from Rila.

In terms of torrentiality degree the rivers in the region of Blagoevgrad fall within the group of low torrential courses, and in terms of river freshet frequency – in the group with 3 to 6 events annually. The average maximum runoff modulus of freshets is about 100 l/s/km2. The solid runoff is considerable – between 700 and 1000 t/year/km2. According to their hydrochemical facies the rivers in the region are referred to the hydrogencarbonate-calcium-sulphate water type.

The floodplain terraces of the rivers possess a groundwater potential, which is used for industrial and household purposes. The talus fan at the Blagoevgradska Bistritsa River mouth is especially pronounced. The groundwater exhibits different extent of its natural runoff in the various parts of the Blagoevgrad kettle, but the maximum values reach up to 5,0 l/s/km2. The total exploitation groundwater reserves for the whole kettle amount to about 25 million cubic meters, 15 million being only for the Blagoevgrad municipality.

There are mineral springs in the city, as well as in the Struma riverbed, several kilometers to the southwest. They are affiliated to the Saparevo-Blagoevgrad hydrothermal basin and are formed in the Blagoevgrad graben. At the time of their capturing (1939) the springs were about 30, with a total flow rate of 7,8 l/s. After drilling explorations (1960) the total flow rate increased to 16,8 l/s, with a temperature of 54,6^{0}C. Blagoevgrad mineral water is used for balneo-prophylactic/therapeutic purposes, as well as for hygiene-household needs.

The hydrographic *assessment* intended for GDP is made taking under consideration the physical and chemical characteristics of the water bodies – river length, catchment area, conditions of preserving and exhausting of water, stream velocity, ice formation phenomena, chemical composition of water. The territory is zoned according to the degree of water provision and potential possibilities of utilizing the water resources for different economic purposes. The information sources are the archives of the hydrometeorological services.

Soils

The territory of Blagoevgrad is situated in the Sofia-Kraishte province of the Balkan sub-zone of the Mediterranean soil zone, located in the Subtropical Xerophytic-forest European Soil Area. Vast proluvial trails are formed in the periphery of the kettle. The soils are alluvial, alluvial-meadow, cinnamon and forest. They are suitable for growing tobacco, fruit, vine and vegetables.

The soil-terrain conditions and the character of the vegetation cover are factors for the development of water erosion and deflation processes. Two types of soil terrains are observed in this region according to the degree of erosion and deflation: 1 – subjected to strong or very strong erosion, and 2 – with available geomorphological conditions for erosion that has not been displayed due to the forest cover.

Flora and fauna

With respect to the floristic zoning of Bulgaria the region of Blagoevgrad falls within two floristic regions – the Dolna Struma and Rila ones. The vegetation is represented by mesophytic, xeromesophytic, xerothermal, steppe and boreal-mountain species. Natural vegetation has been

altered to a significant extent by human activity, being replaced by agricultural crops in the low parts. The vegetation up to 400 m a.s.l. is represented by deciduous xerothermal oak phytocenoses, which occupy restricted areas. The main edificators are the residual forests of pubescent oak, Virgilian oak, and not so often Italian oak, European turkey oak and Oriental hornbeam. The most typical shrubs are Western Prickly Juniper, pistache, Smoke bush, Christ's thorn, etc. The terrains occupied by them are relatively dry, with southern exposure and silicate bedrock. The main tree species at higher altitude (700 m) is Oriental Durmast. Common hornbeam, maple and Oriental hornbeam are found with individual or group participation in the wood stands. Dogwood, Hawthorn and other shrubs are encountered together with the Western Prickly Juniper and Christ's thorn. Beech cenoses are with limited distribution. Scotch pine cultures have been developed.

The forest fund of the Blagoevgrad municipality occupies about 45% of the total territory. The afforested area amounts to about 85% of the forest area. The share of the forests needing reconstruction is significant – 58 000 decares, which is more than 25% of the forest fund.

In zoogeographic respect the Blagoevgrad region is situated at the boundary between the Euro-Siberian and Mediterranean territories, respectively between their Rila-Rhodope and Struma-Mesta regions. The fauna is represented by Holarctic, Paleoarctic, Euro-Siberian and European animal species. The Mediterranean species migrating via the Struma valley have limited representation.

The assessment of the soil-vegetation cover and animal species for the purposes of GDP should be made with the view of the rational use and protection of these resources. The evaluation of the soils includes determination of the main soil types and the areas of their distribution, taking into account to what extent they are subjected to erosion processes. In terms of their use for various economic activities, agro-economic and quality assessment is performed. The suitability of soils for planting and grassing is evaluated for the purposes of urban planning and recreation. The vegetation is characterized with respect to the spreading of main species, ecological and aesthetic features of the plant associations, and their importance for forest-economy, agriculture (pastures and field shelterbelts), recreation (mosaic-type vegetation cover), hydrography (water runoff regulation) and environmental protection (protection of rare species, air-protective function of vegetation). The animal world is characterized with respect to its economic importance, as well as from the viewpoint of its preservation. The evaluation includes the distribution of animal species, their ecological specific features and habitat conditions.

Protected areas

There are nine protected areas in the vicinity of Blagoevgrad – 2 national parks, 1 park, 1 maintained reserve, 4 reserves and 1 nature landmark.

The Rila National Park was proclaimed in 1992. It covers an area of 81046 ha (the largest national park in Bulgaria). It has the status of a protected area of international importance "D".

The Pirin National Park was proclaimed in 1962. It covers an area of 40332,4 ha. It has the status of a protected area of international importance "D" and a site of the world heritage "B".

The "Rila Monastery" park was proclaimed in 2000. It covers an area of 427370,7 ha.

The Gabra maintained reserve (98) was proclaimed in 1949. It covers an area of 89,5 ha. It is situated in the Vlahina Mt.

The Parangalitsa reserve (112) was proclaimed in 1933. It covers an area of 1509 ha. It is situated in the southwest part of the Rila Mt. It has the status of a biosphere reserve "C" and a protected area of international importance "D".

The Rilomanastirska Gora reserve (108) was proclaimed in 1986. It covers an area of 3676,5 ha. It is situated in the west part of the Rila Mt. It has the status of a protected area of international importance "D".

The Bayuvi Dupki – Dzhindzhiritsa reserve (113) was proclaimed in 1934. It covers an area of 2873 ha. It is situated in the northwest part of the Pirin Mt. It has the status of a biosphere reserve "C" and a protected area of international importance "D".

The Tisata reserve (101) was proclaimed in 1949. It covers an area of 574,5 ha. It is situated along the Struma River valley, to the south of Blagoevgrad. It has the status of a protected area of international importance "D".

The Stob Pyramids nature landmark (111) was proclaimed in 1964. It covers an area of 7,4 ha. It is situated in the west part of the Rila Mt. It has the status of a protected area of international importance "D".

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For the purposes of GDP it is also necessary to make:

- A complex *assessment* of the landscapes in a given region;
- The territory should be differentiated in terms of its attractiveness from recreational viewpoint, or in terms of the disturbance of natural landscape due to anthropogenic activity;
- In general, natural conditions and resources should include characteristics of the individual components of the environment and inferences for the extent, effectiveness, complexity and possibilities of using them for various economic purposes;
- It is also important to include a list of the necessary initial materials for the complex assessment of the territory.

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