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THE BULGARIAN MOUNTAIN RESOURCES

Abstract: 39 mountains are situated on the territory of Bulgaria, 8 of which have peaks higher than 2000 m a. s. l.

Mountain areas refer hypsometrically to territories above 600 m altitude (from 600 m up to 2925 m) with a total area of 30,608 km2 or 27,6% of the country. Within this range are situated the resources of forests, pastures, spring waters, game, mountain agriculture and livestock-breeding, as well as tourism and sport facilities. Some small towns, villages and hamlets in the mountains are however depopulated due to migration processes.

Mountain forest resources are spread all over the following vegetation belts: 1. *Carpinus betulus* L.-*Quercus petraea* Liebl. belt, 2. *Fagus sylvatica* L. belt, 3. Coniferous forests belt, 4. Sub-alpine thin forests, *Pinus mugo* Turra and *Juniperus* sp. formations belt. The forests by-products include the returns of hay, foliage, forest fruits, different kind of nuts, lime-blossoms, medical herbs and mushrooms.

The national parks, the bigger part of nature parks and reserves are distributed mainly in the mountains, where they preserve the biodiversity and the genetic resources of plants and animals.

Mountain agriculture and livestock-breeding are directed to traditional bio-products and food security.

Many monasteries, churches and mosques, as part of the cultural-historical heritage, are situated in mountain regions.

Key words: *mountain forests and agriculture, water resources, mountain settlements*

INTRODUCTION

On the territory of Bulgaria (110,993.6 km^2), which covers 22% of the Balkan Peninsula, 39 mountains are situated, 8 of which have peaks higher than 2000 m a. s. l. (Rila Mt. — peak Mousala, 2925 m; Pirin Mt. — peak Vihren, 2914 m; Stara planina Mt. — peak Botev, 2376 m; Vitosha Mt. — peak Cherni vrah, 2290 m; Osogovska Mt. — peak Ruen, 2251 m; Slavyanka Mt. — peak Gotsev vrah, 2212 m; Rhodopi Mts. — peak Golyam Perelik, 2191 m; Belasitsa Mt. — peak Radomir, 2029 m) (BAS, 2011).

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Hypsometrically, territories referring to mountain areas are with an altitude over 600 m a. s. l. and include low-mountain belt (600–1000 m a. s. l.) — 16,911 km^2 (15,3%); middle-mountain belt (1000–1600 m a. s. l.) — 10,899.9 km^2 (9,8%); high-mountain belt (1600–2925 m a. s. l.) — 2797.1 km^2 (2,5%) or totally 30,608 km^2 (27,6%) (Simeonov, Totsev, 1997). This range includes the predominating part of resources of forests, pastures, game, spring waters (including mineral waters), mountain agriculture and livestock breeding, mountain resorts and tourism, etc. However, due to migration processes, there is a process of depopulation in a big part of the mountain towns, villages and hamlets. Numerous monasteries, which are part of the cultural and historical heritage of the country, are situated in mountain regions.

MOUNTAIN WATER RESOURCES

The annual amount of precipitations in mountains grows together with the altitude above sea level up to about 2000 m. After this range, a slight decrease is observed. Precipitations change within wide range: from 800 mm at 600 m a. s. l. to about 1000 mm at 1100 m a. s. l. on northern slopes of Central Balkan Range (Stara planina Mt.), to 1300 mm at 1800 m a. s. l. With biggest water resources are Stara planina Mt. and the Fore-Balkan — 5,5 billion m^3 (31,5% of the country's water resources), Rila, Pirin and the Eastern Rhodopes — 2,5 billion m^3 (12,5% of the country's water resources). The average thickness of snow cover in lower parts of the mountains is about 25–30 cm with duration 2–3 months, and in high parts — up to 150–200 cm with duration 6–7 months (BAS, 2011).

The number of mountain lakes is 394 with an area 7,73 km^2, from which glacier lakes — 330 with area 3,6 km^2 and volume 11 million m^3, the highest among them being the Gorno polezhansko lake in Pirin Mt. — 2710 m a. s. l. (BAS, 2011).

Mineral springs are about 700 and about 90% of them are in mountain parts of South-West Bulgaria. The total capacity of all mineral springs and probes in the country is 5 m^3/s. The "SPA-capital" of Bulgaria is the town Velingrad in the Rhodopes with about 70 mineral springs with capacity 130–140 l/s and water temperature from 43°C to 98°C (BAS, 2011).

The number of dam lakes in the country is about 2200, biggest ones among them being in the mountains: Iskar, Beli Iskar, Belmeken, Batak, Beglika, Dospat, Vucha, Studena. Afforestations and technical torrent-control activities, carried out around Iskar dam lake, contribute to its unusual forecasted long life with a period of silting of the dead capacity 466 years and of the total capacity — 4100 years.

MOUNTAIN FORESTS, PASTURES AND GAME

Mountain forest resources are situated in the following vegetation belts (Velchev, 1997):

— belt of *Carpinus betulus* L.-*Quercus petraea* Liebl. forests (from 600–700 to 900–1000 m a. s. l.);

— belt of beech (*Fagus sylvatica* L.) forests (from 900–1000 to 1300–1500 m a. s. l. The lower part is covered by mixed forests of beech, *Carpinus betulus* L. and

Austrian black pine (*Pinus nigra* Arn.), and the upper part is covered by mixed forests of beech, silver fir (*Abies alba* Mill.), Norway spruce (*Picea abies* (L.) Karst.) and Scots pine (*Pinus sylvestris* L.). The beech area is 615,277 ha;

— belt of coniferous forests (from 1300–1500 to 2000–2100 m a. s. l.). Pure Scots pine and Norway spruce stands predominate but there are also stands of *Abies alba* Mill., *Pinus peuce* Grisb. and *Pinus heldreichii* Christ., etc. The area covered by *Pinus sylvestris* L. is 555,115 ha, by *Picea abies* (L.) Karst. — 160,110 ha, by *Pinus peuce* Grisb. — 13,942 ha, by *Pinus heldreichii* Christ. — 1263 ha (Alexandrov, Dobrev, 2014).

— belt of sub-alpine thin forests, mountain pine (*Pinus mugo* Turra) and juniper formations (from 2000–2100 to 2925 m a. s. l.). Mountain pine and juniper stands are usually spread in this area but in the lower parts there are thin forests of Norway spruce, *Pinus peuce* Grisb. and *Pinus heldreichii* Christ. The mountain pine area is 23,757 ha.

The *in situ* genetic conservation of forest tree species in the mountains is carried out mainly in the following protected areas: 40 reserves (65,583.5 ha) and 16 sustained reserves (949.1 ha) from all 55 reserves (76,978.3 ha) and 35 sustained reserves (4451.5 ha) of the country (Pavlova, Bezlova, 2003), located predominantly in 3 national parks (193,047.9 ha in Rila Mt., Pirin Mt. and Central Balkan Range) and 6 nature parks (126,946 ha) from all 11 nature parks (273,469 ha) (WWF, 2015), as well as of permanent seed production stands.

Area managed for *in situ* gene conservation of conifer forests reaches up to 38,652.7 ha (3,5%), from which reserves — 25,281.2 ha, sustained reserves — 262.1 ha, native permanent seed production stands — 13,109.4 ha. The average size of these stands (6,4 ha) is determined by strongly variable ecological conditions in the mountain landscape of Bulgaria. Participation of different coniferous forest tree species within *in situ* conservation units is uneven. Highest value has *Pinus heldreichii* Christ. (88,4%), e. g. almost its entire area, followed by *Pinus mugo* Turra (36%), *Pinus peuce* Grisb. (19,4%), *Abies alba* Mill. (10,4%) and *Picea abies* (L.) Karst. (6,9%), which show very good gene conservation *in situ* (Alexandrov, Dobrev, 2014).

Mountain pastures in the country are about 1,215,200 ha, from them 270,000 ha are natural meadows, 136,000 ha — high-mountain pastures and the rest — woodland pastures. Main meadow types are: *Andropogon gryllys*, *Alopecurus — Festuca* and *Agrostis — Festuca*. The initial date for grazing, depending on latitude and exposure at 1000 m a. s. l., is during the period 12 March — 9 April, and at 2000 m a. s. l. is during the period 15 May — 25 May. The average hay yield amounts to 2–2,5 t/ha, which is considered to be relatively low (BAS, 1989). Typical grass species in meadows and pastures, according to vegetation belts, are as follows:

— belt of mesophytic and xeromorphic oak and hornbeam forests — *Poa nemoralis*, *Luzula luzuloides*, *Agrostis capillaries*, *Festuca elatior*, *Trifolium patens*, *Trifolium pratense*, *Centaurium umbelatum*, etc.;

— belt of beech forests — *Seslaria latifolia*, *Agrostis capillaris*, *Pteridium aquilinum*, *Galium odoratum*, *Festuca montana*, *Dactylis glomerata*, *Alium ursinum*, *Geranium macrorrhizum*, etc.;

— belt of coniferous forests — *Calamagrostis epigeios*, *Brachypodium pinnatum*, *Oxalis acetosella*, *Anemone nemorosa*, *Geranium sylvaticum*, *Trifolium medium*, *Calamagrostis arundinaceae*, *Luzula luzuloides*, etc.

— belt of subalpine thin forests, mountain pine and juniper scrubwoods — *Festuca valida*, *Festuca nigrescens*, *Agrostis tenuis*, *Sesleria comosa*, *Rumex alpinum*, *Poa annua*, *Poa media*, *Nardus stricta*, *Bruckenthalia spiculifolia*, etc.;

— belt of alpine vegetation — *Sesleria comosa*, *Festuca airoides*, *Festuca riloensis*, *Agrostis rupestris*, *Carex curvula*, *Poa media*, *Poa pirinica*, etc.

The total game area in the mountain zone is about 3 million ha, from which 1,5 million is for red deer and 2,5 million ha — for roe and wild-boar (BAS, 1989).

The game inventory shows the following approximate stock of some native species: *Cervus elaphus* L. — 24,500, *Cervus dama* L. — 7350, *Capreolus capreolus* L. — 102,000, *Sus scrofa* L. — 90,200, *Rupicapra rupicapra* L. — 1850, *Ursus arctos* L. — 980, *Canis lupus* L. — 2600, *Canis aureus* L. — 48,000, *Tetrao urogallus* L. — 3000, *Alectoris graeca* L. — 19,900, and for introduced: *Bison bonasus* L. — 32, *Bos mutus* P. — 22 (Rusev, 2015). The stock of *Cervus elaphus* L., *Cervus dama* L. and *Capreolus capreolus* L. is below the allowed for the country and this one of *Sus scrofa* L. and *Canis aureus* L. — over the allowed. The game health status in the country could be assessed as good. From totally 28 state game management enterprises, 18 are mountainous and are used for both game breeding and hunting and for gene fund conservation.

The non-wood forest products include collecting of herbs, forest fruits, nuts, mushrooms, lime-blossom and other derivates. From about 4000 higher plants in the country, 800 are medicinal but only 1/3 of them are used. Bulgaria takes first place in Europe and fourth in the world in herbs export. From 15–17,000 t, which are bought up annually, 80–90% are exported, including lime-blossom, hip, spearmint, nettle, etc. With a view to regulate their utilisation, the Ministry of Environment and Waters updates the list of herbs, which are prohibited to be collected for economic purposes. Due to this reason, as well as to obtain higher yield, some of the herbs are already cultivated on agricultural lands, including spearmint, camomile, common balm, nettle, Mursalitsa tea, etc.

Most frequently collected forest fruits and nuts are: blackberries, blueberries, raspberries, cornels, walnuts, hazelnuts, etc., reaching up to hundreds of tons in harvest years.

MOUNTAINOUS AGRICULTURE AND STOCK-BREEDING

Bulgarian agriculture disposes of 3,469,388 ha arable land and is developed mainly in the Danube plain, Thracian lowland and fore-mountainous areas. However, farm crops are grown in mountainous regions as well — such as rye and triticale — totally 37,020 ha, oat — 21,732 ha, potatoes — 10,224 ha (MAF, 2015). Potato sowing-seeds are produced in mountains mainly in the region of Samokov and Smolyan.

Stock-breeding during years of transition from planned centralised to free market economy shows in general significant decrease of domestic animals and of the elite breeding material. The total number of cattle is 553,000, of sheep — 1,335,000,

goats — 293,000, and the biggest part of it is grown in mountainous areas. Bee swarms reach up to 57,304 and the bee honey production — 9268 t with high variety and taste quality (MAF, 2015). The Institute of Mountainous Stock-Breeding and Agriculture in Troyan produces planting material from raspberries, blackberries, aronia, *Hippophaë rhamnoides* L., *Sorbus domestica* L., American berries and cranberries. It has also carried out breeding of white Bulgarian milch goat and Balkan sheep — cigai. In fruit-growing, sorts like *Prunus domestica* L. 'Balev' and 'B 2–24', *Sorbus domestica* L. 'Forest beauty' have been invented, and in fodder production — *Phleum pratense* L. 'Troyan' and *Festuca pratensis* Huds 'Elena'.

One of the milk products of world renown — Bulgarian yoghurt — is made with the bacterium *Lactobacillus bulgaricus*, described in 1905 by Dr. Stamen Grigorov, and Prof. Ilya Metchnikoff claims that the use of yoghurt slows down ageing and leads to long life. Other specific milk products — Bulgarian white brined cheese (51,225 t/annum) and kashkaval (yellow cheese) (19,692 t/annum) — are produced with highest quality under conditions of mountainous climate.

MOUNTAIN RESORTS AND TOURISM

The total number of well recognised mountain and ski resorts is 22, situated in the Rhodopes, Rila Mt., Pirin Mt., Stara planina Mt., Vitosha Mt. and Osogovo Mt., and 3 of them are with international status: Bansko in Pirin Mt. with 70 km ski runs, Borovets in Rila Mt. with 50 km ski runs and Pamporovo in the Rhodopes — with 16 km ski runs.

The balneological and SPA resorts are totally 28, from which 17 are typical mountainous, situated at the foot of the Rila-Rhodopes massif, Stara planina Mt., Sredna gora Mt. and Osogovo Mt.

Mountain tourism infrastructure includes 235 huts (from totally 269 in the country) in 18 mountains, 40 shelters, 36 tourist dormitories and 39 hotels. The highest number of huts is in Stara planina Mt. (89), the Rhodopes (46) and Rila Mt. (30) (Novakov, 2013).

MONASTERIES

There are 154 monasteries built in 31 mountains, where Christianity and Bulgarian spirit have been kept over the centuries. They are most numerous in Stara planina Mt. — 38, Fore-Balkan — 23 and in the Rhodopes — 16. Most popular are the Rila, the Bachkovo and Troyan monasteries, situated respectively in Rila Mt., the Rhodope Mts. and the Central Balkan Range.

CONCLUSION

Economic and financial crises in the period of transition, and especially in the last years, demand looking for resources and markets. These opportunities are provided by mountain resources — waters, forests, pastures, game, agriculture, stockbreeding, resorts and tourism, combined with cultural and historical heritage.

Bulgaria, like any other Balkan country, has big mountain massifs whose resources contribute to overcome crisis processes in economics, supporting entrepreneurship in various economic sectors in mountain regions.

Collaboration on mutual projects for development of mountain resources in Europe, like "Katun" project, deserves special attention for their initiation and advance.

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BUGARSKI PLANINSKI RESURSI

Rezime

Na teritoriji Bugarske nalazi se 39 planina, od kojih 8 imaju vrhove veće od 2000 m nadmorske visine.

Planinska područja se odnose hipopsometrijski na teritorije iznad 600 m nadmorske visine (od 600 m do 2925 m) sa ukupnom površinom od 30,608 km2 ili 27,6% teritorije zemlje. U okviru ovog raspona nalaze se resursi šuma, pašnjaka, izvora, divljači, planinske poljoprivrede i stočarstva, kao i turističkih i sportskih objekata. Međutim, neki mali gradovi, sela i zaseoci u planinama ostaju bez populacije zbog migracionih procesa.

Resursi planinskih šuma rasprostranjeni su po sljedećim vegetacionim pojasevima: 1. pojas — Carpinus betulus L.-Quercus petraea Liebl. kaiš, 2. pojas — Fagus sylvatica L., 3. pojas četinarske šume, i 4. pod-alpske tanke šume, pojas Pinus mugo Turra i Juniperus sp. Nusproizvodi šuma uključuju sijeno, lisnik, šumske plodove, različite vrste oraha, ljekovito bilja i pečuraka.

Nacionalni parkovi, veći dio parkova prirode se prostiru uglavnom u planinama, gdje očuvaju biodiverzitet i genetičke resurse biljaka i životinja.

Planinska poljoprivreda i stočarstvo se usmjeravaju na tradicionalne bio-proizvode i sigurnost hrane.

Mnogi manastiri, crkve i džamije, u sklopu kulturno-istorijskog nasljeđa, nalaze se u planinskim područjima.

Ključne riječi: *šume i planinska poljoprivreda, vodni resursi, planinska naselja*