Mapping of the vegetation cover and habitat types under NATURA 2000 in the Rila Mts

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Abstract. The article deals with the methodology of 1:25000 mapping of the vegetation and habitat types under NATURA 2000 in the high parts of the Rila Protected Area. Analysed are the principles, composition and structure of the established spatial subunits called complexes and covering specified areas of the given territory – polygons. In polygon setting, the approach was partially phytocoenotic and partially geographical.

Key words: map, vegetation, habitats, Rila Mts

Introduction

The problems emerging while studying spatial distribution of the vegetation groups have been discussed so far in hundreds of publications (Grisebach 1838; Du Rietz 1917, 1930; Knapp 1948; Bolòs 1963; Schmithüsen 1968, 1976; Tuxen 1973, 1977; Theurillat 1992; Gribova & Isatchenko 1972, etc.). Various schools and authors suggest setting of different and, along with this, close spatial (territorial) units and classification schemes. A new scientific discipline has emerged called Symphytosociology. The complexity of problems, however, still delays their overall solution. Particularly difficult is the mapping of vegetation cover in the mountains, especially in their high parts.

Some problems of the structure of vegetation cover in the Bulgarian mountains have already been tackled in Bulgarian publications (Roussakova 1974, Roussakova-Anastassova 1977, 1978, 1983, 1986). In 1995–1997, a 1:25000 partial mapping of the vegetation cover in the Musala Divide of the Rila Mts was carried out. The results were summed up in a report for the National Scientific Research Fund which had assigned the task. The area was visited again in 2008 under another poject. In 2011, the Ministry of Environment and Waters entrusted the Natura 2000 Consortium with the implementation of the project "Mapping and definition of the environmental status of natural habitats and species: Phase I". Along these lines, the mapping of habitat types in the Rila Protected Area has posed a number of issues of practical and theoretical nature. The present study analyses the principles, composition and structure of the established spatial subunits, called complexes, for the purposes of proper mapping of the vegetation cover and their transformation into mapping units under NATURA 2000.

Material and methods

In terms of mapping, the limited area of most concrete syntaxa terrains requires the use of some specific aspects of the spatial organization of vegetation. The present study employs the category "complex". This term occurs frequently in literature, but its meaning varies rather widely. In the present case, a complex shall mean repeated combinations of vegetation groups in a specified area of the given territory, called "polygon".

In the process of polygon-setting, our approach was partially phytocoenotic, and partially geographical, and the basic vegetation and geomorphological criteria were followed. A polygon is a sufficiently homogeneous territory, visually and in terms of composition and structure of the vegetation and ecotope. The vegetation group or combination (mosaic) of vegetation groups in it differs from that in the adjacent areas. Geomorphological data supplement significantly the indication of polygons. Relief (elements of the meso-, micro- and nanorelief), altitude, exposition, incline, substrate, and soils are chiefly used for the purpose. That is why fieldwork in 1995 an 1997 employed the help of geomorphologist Angel Velchev. The work scale was 1:10000 and the final scale was 1:25000.

Inventory of the polygons was carried out by their visiting along diagonal or parallel routes, allowing for the opportunities presented by the concrete relief. The existing plant groups were subject to thorough phytocoenotic description and their geomorphological characteristics were also noted down. Subsequently, the phytocoenoses were referred by description to the respectice syntaxa. In case of rankless groupings of the vegetation species occurring frequently in the mountains, it was resorted to their syndynamic orientation, according to the expert's experience. The area of single plant elements was estimated by eye, as percentage of the general area of the repsective polygon. Six hundred and fifty-two descriptions were made of almost all identified syntaxa in the high-mountain range of the Rila Mts (Roussakova & Indgean 1998; Roussakova 2000; Tzonev & al. 2009). In the vegetation of the analysed mountain territory, 11 classes, 12 orders, 16 alliances, and 44 associations and subassocations were differentiated. This diversity of syntaxa must be used for polygon-setting and should be divided between the 12 types of natural habitats and taxa under NATURA 2000 distributed in the region. According to the Directive 92/43 EEC, "Natural habitats mean terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features rendering them a specific pattern". Classification of habitats (by four-digit codes) under Directive 92/43 EEC was developed by the European Ecological Network of Protected Areas NATURA 2000. Some problems in the methodology of mapping of habitat types under NATURA 2000 in the high parts of the Rila Protected Area in particular are one of the purposes of the present study.

The studied area of the Musala Divide in the Rila Mts lies on and around peaks Musala (2925 m), Irechek (2852 m), Studen Vrah (2784 m), Deno (2790 m), Shatar (2495 m), Dalgiya Rid, also called Sredniya Chukar (2532 m), and the beginning of the valley of river Musalenska Bistritsa.

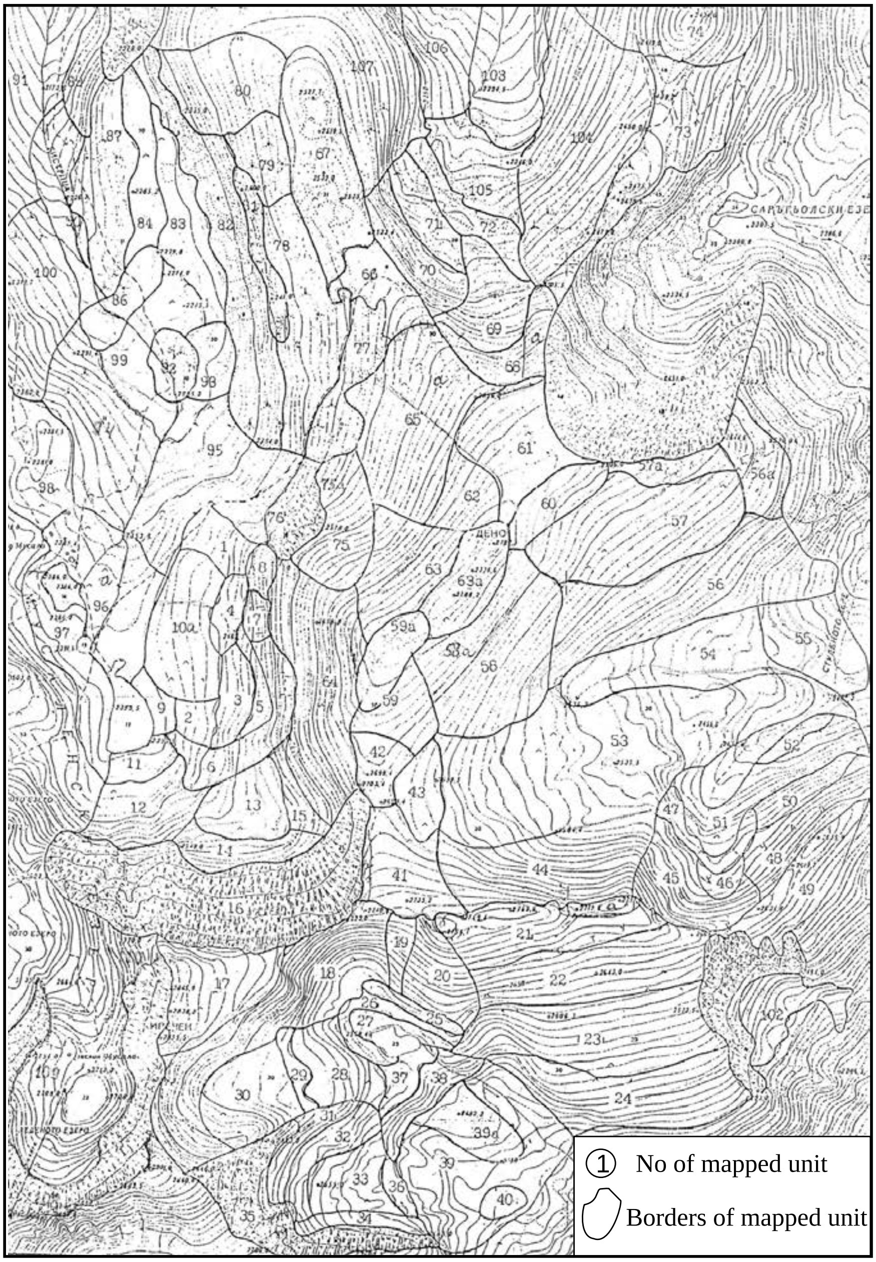
The litological base in the region is generally uniform. The granitorids building up that part of the mountain are acid. All rocks are strongly cracked and eroded (Stojtchev & Petrov 1981). In the formation and spatial distribution of vegetation and habitat types, this composition of the rock complex assings a major role to the climatic factors, relief and soils.

Relief is one of the main factors for determining and allocation of the environmental specificity to a given territory and for distribution of the concrete areas of the syntaxa and habitat types as independent mapping units (if scale permits), or spatially combined into complexes. In the present study area, glacial and erosion and accumulative relief forms prevail.

One can get an idea about the climatic conditions at Peak Musala from the length of the period without snow cover: 4–6, or occasuionally 1–2 months. A main feature of the high-mountain climate in Rila is the strong, almost permanent, mainly north-westerly winds. They play to a great extent a determining role in the formation and distribution of the vegetation and habitat types. The micro- and nanoclimatic condititions, which exert a strong impact on the development of vegetation and habitats, vary strongly.

In order to elucidate the soil conditions in the region, soil cores from different in composition and structure areas are described. The results showed some very well developed mountain-meadow chernozem soils, up to 90 cm deep, and some rather shallow, mountain-meadow peaty soils – young or well-fomed, regosols and rankers.

In the study area, many circques, high peaks, trough valleys with varying in area terraces and predominantly steep slopes form the complex structure of the physical and geographical environment. Few concrete syntaxa and habitat areas could be given in a selected scale as independent mapping units. This has led to setting up a great number of polygons in that otherwise insignificant in terms of area part of the mountain, and in the Rila Protected Area in particular, for the purpose of presenting the vegetation cover and taxa under NATURA 2000 (Table 1, Map 1). Thus the territorial mapping units mostly represent a complex of several taxa (syntaxa or habitat types, respectively), which mostly cover the space of a specific relief form (Table 2).



Map 1. Vegetation complexes and habitat types under NATURA 2000 in the Musala Divide of the Rila Mts.

Table 1. Syntaxa and habitat types under NATURA 2000 in part of the Musala Divide of the Rila Mts.

Alliances, associations and subassociations	**Habitat type**
Silenion lerchenfeldianae Horvat & Pawl. ap. Horvat 1949	
Sileno lerchenfeldianae-Potentilletum haynaldianae Horvat, Pawl. & Walas 1937	8220 – Siliceous Rocky Slopes with Chasmophytic Vegetation
Geo-Saxifragetum cymosae Rouss. 2000	8220 – Siliceous Rocky Slopes with Chasmophytic Vegetation
Androsacion alpinae Br.-Bl. 1926	
Oxyrio dyginae-Poetum contractae Ht, Pawl. & Walas 1937	8110 – Siliceous Scree of the Montane to Snow Levels
Senecioni-Juncetum trifidi Simon 1957	8110 – Siliceous Scree of the Montane to Snow Levels
Festucion pictae Krajina 1933	
Festucetum pictae Domin 1931 *achilleetosum clusianae* (Simon1957) Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels 62D0 – Oro-Moesian Acidophilous Grasslands
Salicion herbaceae Br.-Bl. 1926	
Primulo-Salicetum herbaceae typicum Rouss. 2000	6150 – Siliceous Alpine and Boreal Grasslands
Primulo-Salicetum herbaceae poetosum mediae Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels

Table 1. Continuation.

Alliances, associations and subassociations	**Habitat type**
Omalotheco-Alopecuretum gerardii Mucina et alii 1990	8110 – Siliceous Scree of the Montane to Snow Levels
Alopecuro (*riloensis*)-*Ranunculetum crenati* Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels
Omalotheco-Polytrichetum piliferi Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels
Achilleo (*clusianae*)-*Luzuletum velenovskyi* Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels
Alopecuretum riloensis typicum Rouss. 2000	8110 – Siliceous Scree of the Montane to Snow Levels
Alopecuretum riloensis caricetosum pyrenaicae Rouss. 2000	6230 – * Species-Rich Nardus Grassland
Alopecuro-Plantaginetum gentianoidis Rouss. 2000	6230 – * Species-Rich Nardus Grassland
Leontodonto-Plantaginetum atratae Rouss. 2000	6230 – * Species-Rich Nardus Grassland
Loiseleurio-Vaccinion Br.-Bl. in Br.-Bl. et Jenny 1926	
Empetro-Vaccinietum Br.-Bl. 1926 *seslerietosum comosae* (Simon 1957) Rouss. 2000	4060 – Alpine and Boreal Shrubs
Festuco-Vaccinietum uliginosi Rouss. 2000	4060 – Alpine and Boreal Shrubs
Seslerion comosae Horvat 1935	
Campanulo-Caricetum curvulae Rouss. in Tzonev & al. 2009	6150 – Siliceous Alpine and Boreal Grasslands
Carici-Festucetum riloensis typicum Horvat & al. 1937	6150 – Siliceous Alpine and Boreal Grasslands
Carici-Festucetum riloensis minuartetosum orbelicae Horvat & al. 1937	6150 – Siliceous Alpine and Boreal Grasslands
Agrostio-Seslerietum comosae typicum Horvat & al. 1937	6150 – Siliceous Alpine and Boreal Grasslands
Agrostio-Seslerietum comosae caricetosum curvulae Simon 1957	6150 – Siliceous Alpine and Boreal Grasslands
Agrostio-Seslerietum comosae festucetosum airoidis Rouss. 2000	6150 – Siliceous Alpine and Boreal Grasslands
Agrostio-Seslerietum comosae antennarietosum dioicae Horvat & al. 1937	6150 – Siliceous Alpine and Boreal Grasslands
Festuco riloensis-Caricetum rupestris ass. preliminary	6150 – Siliceous Alpine and Boreal Grasslands
Poion violaceae Horvat 1937	
Festucetum validae Horvat, Pawl. et Walas 1937 typicum Rouss. 2000	62D0 – Oro-Moesian Acidophilous Grasslands
Festucetum paniculatae Horvat 1936	62D0 – Oro-Moesian Acidophilous Grasslands
Potentillo (*ternatae*)-*Nardion* Simon 1957	
Seslerio-Caricetum bulgaricae Rouss. in Tzonev & al. 2009	6150 – Siliceous Alpine and Boreal Grasslands 6230 – * Species-Rich Nardus Grassland
Nardo-Caricetum bulgaricae Rouss. in Tzonev & al. 2009	6230 – * Species-Rich Nardus Grassland
Diantho-Nardetum strictae Rouss. in Tzonev & al. 2009 typicum Rouss. Rouss.2000	6230 – * Species-Rich Nardus Grassland
Diantho-Nardetum strictae festucetosum airoidis Rouss. 2000	6230 – * Species-Rich Nardus Grassland
Grpt. of *Poa media*	6230 – * Species-Rich Nardus Grassland
Caricion nigrae Koch. 1926. em Klika 1934	
Primulo exiguae-Primuletum deori Horvat & al.1937	7140 – Transition Mires and Quaking Bogs
Primulo deori-Caricetum nigrae Rouss. 2000	7140 – Transition Mires and Quaking Bogs
Primulo-Nardetum strictae Rouss. 2000	7140 – Transition Mires and Quaking Bogs
Primulo-Trichoforetum caespitosae Rouss. 2000	7140 – Transition Mires and Quaking Bogs
Cardamino-Montion Br.-Bl. 1925	7140 – Transition Mires and Quaking Bogs
Philonotido-Saxifragetum stellaris Horvat 1949	7140 – Transition Mires and Quaking Bogs
Cirsion appendiculati Horvat & al.1937	
Angelico-Heracleetum verticillati Horvat & al. 1937	6430 – Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels
Carici-Deschampsietum caespitosae Rouss. 2000	6430 – Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels
Pinion mugo Pawlowski 1928	
Lerchenfeldio-Pinetum mugo typicum Rouss. 2000	4070 – * Bushes with *Pinus mugo* and *Rhododendron hirsutum*
Lerchenfeldio-Pinetum mugo eriophoretosum vaginati Rouss. 2000	91D0 – * Bog Woodland
Lerchenfeldio-Pinetum mugo cetrarietosum islandicae Rouss. 2000	4070 – * Bushes with *Pinus mugo* and *Rhododendron hirsutum*
Lerchenfeldio-Pinetum mugo cirsietosum appendiculati Rouss. 2000	4070 – * Bushes with *Pinus mugo* and *Rhododendron hirsutum*
Campanulo abietinae-Juniperetum sibiricae Simon 1966	4060 – Alpine and Boreal Heaths
Festuco-Juniperetum sibiricae Rouss. In Tzonev & al. 2009	4060 – Alpine and Boreal Heaths
Seslerio-Juniperetum sibiricae Rouss. 2000	4060 – Alpine and Boreal Heaths

Table 2. Mapping units of the vegetation cover and habitat types under NATURA 2000.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
1	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Achilleo (clusianae)-Luzuletum velenovskyi; Primulo deori-Caricetum nigrae; Nardo-Caricetum bulgaricae; Diantho-Nardetum strictae typicum; Festucetum pictae achilleetosum clusianae*	Ground moraine with sheep rocks (roche moutonnée), screes, depressions with brooks, springs. Moderate general incline northwards.	4070 – 70 %; 8110 – 15 %; 7140 – 5 %; 6230 – 5 %
2	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum; *Primulo deori-Caricetum nigrae; Philonotido-Saxifragetum stellaris; Diantho-Nardetum strictae typicum; Agrostio-Seslerietum comosae caricetosum curvulae*	Ground moraine with depressions, brooks and springs. Soils varying in depth and development. Moderate W incline.	8110 – 30 %; 4070 – 30 %; 7140 – 20 %; 6230 – 10 %; 6150 – 10 %
3	*Primulo exiguae-Primuletum deori; Seslerio-Caricetum bulgaricae; Agrostio-Seslerietum comosae festucetosum airoidis; Campanulo-Caricetum curvulae; Lerchenfeldio-Pinetum mugo* typicum; *Campanulo-Juniperetum sibiricae;Alopecuro-Plantaginetum gentianoides; Leontodonto-Plantaginetum atratae*	Depression with marked nanorelief, places around springs and brooks. Generally slight incline SW.	7140 – 40 %; 6150 – 40 %; 6230 – 15 %; 4070 – 5 %; 4060 – 5 %
4	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis, -caricetosum curvular; Alopecuretum riloensis* typicum; *Seslerio-Caricetum bulgaricae*	Sheep rocks (roche moutonnée), very rugged relief. Soils varying in depth and development.	4070 – 50 %; 8110 – 25 %; 6150 – 25 %
5	*Agrostio-Seslerietum comosae caricetosum curvulae; Festuco-Vaccinietum uliginosi; Lerchenfeldio-Pinetum mugo* typicum; *Campanulo-Juniperetum sibiricae; Senecioni-Juncetum trifidi*	Cryonival niches and swells – uplifted relief. Soil shallow and poorly developed.	6150 – 50 %; 8110 – 25 %; 4070 – 20 %; 4060 – 5 %
6	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Achilleo (clusianae)-Luzuletum velenovskyi;Geo-Saxifragetum cymosae; Sileno lerchenfeldianae-Potentilletum haynaldianae; Lerchenfeldio-Pinetum mugo* typicum, *-cetrarietosum islandicae;* grpt.* and *Carici-Festucetum riloensis*; grpt. and *Agrostio-Seslerietum comosae; Seslerio-Juniperetum sibiricae; Festuco-Vaccinietum uliginosi*	Steep W slope. Rocks, large-fragment and pebble screes, chutes, cryonival niches, depressions. Soil poorly developed. Fragments of herb communities and groups dominate.	8110 – 35 %; gpt. and 6150 – 25 %, 4070 – 20 %; 8220 – 15 %; 4060 – 5 %
7	*Geo-Saxifragetum cymosae; Sileno lerchenfeldianae-Potentilletum haynaldianae; Carici-Festucetum riloensis; Lerchenfeldio-Pinetum mugo* typicum; *Seslerio-Juniperetum sibiricae; Festuco-Vaccinietum uliginosi; Senecioni-Juncetum trifidi*	Steep W slope with dominance of rock outcrops, few stony screes and cryonival niches. Soil poorly developed.	8220 – 30 %; 6150 – 25 %; 4070 – 20 %; 8110 – 15 %; 4060 – 10 %;
8	*Lerchenfeldio-Pinetum mugo* typicum; *Geo-Saxifragetum cymosae; Carici-Festucetum riloensis, Agrostio-Seslerietum comosae* typicum	Steep W slope with rocks, screes and an avalanche chute. Soil cover poorly developed.	4070 – 80 %; 8110 – 10 %; 6150 – 10 %
9	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum; *Nardo-Caricetum bulgaricae; Carici-Deschampsietum caespitosae*	Ground moraine. Soil cover poorly developed. Huge rock blocs.	8110 – 65 %; 4070 – 25 %; 6430 – 10 %
10, 10a	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi;* 10a – *Lerchenfeldio-Pinetum mugo typicum; Nardo-Caricetum bulgaricae; Philonotido-Saxifragetum stellaris; Primulo deori-Caricetum nigrae; Agrostio-Seslerietum comosae caricetosum curvulae; Campanulo-Juniperetum sibiricae; Primulo-Nardetum strictae; Campanulo-Caricetum curvulae*	Ground moraine, uplifted relief. Very stony. In the southern part (10a), with plenty of springs and moist places. Shallow and skeletal soil dominates.	10 – 4070 – 90 %; 8110 – 10 % 10a – 4070 – 65 %; 8110 – 10 %; 7140 – 10 %; 6230 – 10 %; 6150 – 5 %
11	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Agrostio-Seslerietum comosae typicum; Festuco-Vaccinietum uliginosi; Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum	Cryonival swell. Huge rock fragments. Soils different in depth and development.	8110 – 85 %; 6150 – 5 %; 4060 – 5 %; 4070 – 5 %
12	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Agrostio-Seslerietum comosae caricetosum curvulae; Alopecuro (riloensis)-Ranunculetum crenati*	River-bed dead end and scree, mainly of small-size weathering material. Undulating relief.	8110 – 100 %
13	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Omalotheco-Polytrichetum piliferi; Alopecuretum riloensis* typicum; grpt. of *Taraxacum* sp.; *Agrostio-Seslerietum comosae caricetosum curvulae, -festucetosum airoidis; Seslerio-Juniperetum sibiricae*	Cirque floor. Monadnocks. Screes, avalanche chutes, avalanche swells.	6150 – 45 %; 8110 – 50 %; 4060 5 %
14; 34	*Senecioni-Juncetum trifidi; Oxyrio dyginae-Poetum contractae; Festucetum pictae achilleetosum clusianae*	Screes N, of small- and large-fragment weathering material. Undulating relief.	8110 – 100 %
15	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Festucetum validae* typicum; *Seslerio-Juniperetum sibiricae*	Stone field at the foot of a slope with W, SW exposition.	4060 – 35 %; 62D0 – 35 % 8110 – 30 %;

Table 2. Continuation.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
16; 35; 50; 108	*Geo-Saxifragetum cymosae; Senecioni-Juncetum trifidi; Oxyrio dyginae-Poetum contractae;Agrostio-Seslerietum comosae caricetosum curvulae; Carici-Festucetum riloensis; Empetro-Vaccinietum seslerietosum comosae*	Rock complexes, mainly with N exposition, with vertical and very steep walls, screes, fragments of alpine vegetation.	8220 – 60 %; 8110 – 20 %; 6150 – 20 %;
17; 20, 21, 27; 30, 33, 63, 68	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae; Carici-Festucetum riloensis; Campanulo-Caricetum curvulae; Seslerio-Caricetum bulgaricae;Alopecuretum riloensis* typicum	Stone fields of large rock fragments at 2500 m a.s.l., different incline, no soil cover.	8110 – 60–90 % 6150 – 10–40 %;
18, 32, 102	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae caricetosum curvulae, -festucetosum airoidis; Carici-Festucetum riloensis* typicum; *Festucetum validae* typicum; *Lerchenfeldio-Pinetum mugo* typicum	Screes and rock outcrops with meridional exposition on strongly inclined cirque walls. Soil cover poorly developed.	8110 – 50 %; 6150 – 25 %; 62D0 -23 %; 4070 – 2 %
19	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; gpt. of Poa media*	Screes S, of medium- and small-frgment wethering material.	8110 – 50 %; 6150 – 50 %
22, 57a	*Carici-Festucetum riloensis; Agrostio-Seslerietum comosae caricetosum curvulae, – festucetosum airoidis; Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Philonotido-Saxifragetum stellaris*	Rock rings with moderate incline, springs, depressions with snowdrifts. Soils of different depth.	6150 – 60 %; 8110 – 25 %; 4060 – 10 %; 7140 – 5 %
23	*Seslerio-Juniperetum sibiricae; Agrostio-Seslerietum comosae festucetosum airoidis, -caricetosum curvulae; Campanulo-Caricetum curvulae; Omalotheco-Alopecuretum gerardii; Senecioni-Juncetum trifidi; Diabtho-Nardetum strictae festucetosum airoidis*	Parts of slope with slight/moderate incline and undulating relief. Well-developed soil and vegetation.	6150 – 45 %; 4060 – 40 %; 8110 – 10 %; 6230 – 5 %
24, 78	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Festucetum validae* typicum; *Seslerio-Juniperetum sibiricae; Achilleo (clusianae)-Luzuletum velenovskyi*	Moderate to considerable incline of a slope part with meridional exposition. Poorly or well-developed soils and vegetation.	4070 – 60 %; 8110 – 10 %; 6150 – 10 %; 62D0 – 10 %; 4060 – 10 %
25	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Sileno lerchenfeldianae-Potentilletum haynaldianae; Agrostio-Seslerietum comosae festucetosum airoidis; Festuco-Juniperetum sibiricae*	Rock outcrops and screes on a slope with moderate incline and meridional exposition. Poorly to medium developed soils.	4070 – 50 %; 8110 – 15 %; 6150 – 15 %; 8220 – 10 %; 4060 – 10 %
26	*Senecioni-Juncetum trifidi; Campanulo-Caricetum curvulae; Agrostio-Seslerietum comosae festucetosum airoidis; Geo-Saxifragetum cymosae*	Rock rings, screes of large rock fragments, swells. Soils very poorly developed.	8110 – 80 %; 8220 – 10 % 6150 – 10 %
28	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Sileno lerchenfeldianae-Potentilletum haynaldianae; Agrostio-Seslerietum comosae festucetosum airoidis; Festuco-Juniperetum sibiricae*	Terrace on an upper hanging cirque. Mainly poorly developed soils. Domnating E exposition.	8110 – 40 %; 6150 – 30 %; 4070 – 20 %; 8220 – 10 %
29	*Senecioni-Juncetum trifidi; Campanulo-Caricetum curvulae; Agrostio-Seslerietum comosae festucetosum airoidis, -caricetosum curvulae; Seslerio-Caricetum bulgaricae; Lerchenfeldio-Pinetum mugo*	Cryonival swell. Screes of large-size rock fragments. Very poorly developed soils.	8110 – 60 %; 6150 – 30 %; 4070 – 10 %
31	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Festucetum validae* typicum; *Sileno lerchenfeldianae-Potentilletum haynaldianae;*	Rocks and screes on a slope with SSE exposition in a hanging cirque.	8110 – 30 %; 6150 – 40 %; 62D0 – 20 %; 8220 – 10 %
36	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Lerchenfeldio-Pinetum mugo; Festucetum pictae achilleetosum clusianae*	Moraine swell. Scres of large rock fragments. Very poorly developed soils.	8110 – 60 %; 6150 – 20 %; 4070 – 20 %;
37	*Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum; *Agrostio-Seslerietum comosae festucetosum airoidis; Campanulo-Caricetum curvulae; Festuco-Vaccinietum uliginosi*	Uplifted relief on the floor of a cirque.	4060 – 40 %; 6150 – 30 %; 4070 – 30 %
38	*Seslerio-Juniperetum sibiricae; Festuco-Juniperetum sibiricae; Festucetum validae* typicum; *Lerchenfeldio-Pinetum mugo* typicum; *Festucetum pictae achilleetosum clusianae; Festucetum paniculatae*	River-bed dead end5, considable incline, poorly developed soils.	4060 – 25 %; 62D0 – 25 %; 4070 – 25 %; 8110 – 25 %

Table 2. Continuation.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
39, 39a	*Primulo-Nardetum strictae; Philonotido-Saxifragetum stellaris; Agrostio-Seslerietum comosae festucetosum airoidis; Angelico-Heracleetum vericillati; Leontodonto-Plantaginetum atratae; Diantho-Nardetum strictae festucetosum airoidis* 39a – *Leontodonto-Plantaginetum atratae; Diantho-Nardetum strictae* typicum; *Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum;	Generally, slightly SE inclined part of a slope, with very distinct nanorefief, rivulets, marshy places. 39a – a rock hump with a levelled crest.	39 – 6230 – 40 %; 6150 – 30 %; 7140 – 20 %; 6430 – 10 %; 39a – 6230 – 60 %; 4060 -20 %; 4070 5 %; 6150 -5 %
40	*Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae*	Marshy area.	7140 – 100 %
41	*Carici-Festucetum riloensis* typicum; *Primulo-Salicetum herbaceae typicum; Agrostio-Seslerietum comosae caricetosum curvulae; Alopecuro (riloensis)- Ranunculetum crenati; Festuco-Caricetum rupestris; Senecioni-Juncetum trifidi*	Part of crest with moderate N incline, marked nanorelief. Soil cover of various depth and development, limited erosion.	6150 – 90 %; 8110 – 10 %
42, 61, 65a	*Carici-Festucetum riloensis* typicum; *-minuartetosum orbelicae; Senecioni-Juncetum trifidi; Campanulo-Caricetum curvulae*	Ridge areas or slopes above 2500 a.s.l. exposed to strong winds, often with eroded soils.	6150 – 90 %; 8110 – 10 %
43	*Agrostio-Seslerietum comosae typicum; Omalotheco-Polytrichetum piliferi; Campanulo-Caricetum curvulae; Senecioni-Juncetum trifidi*	Nanodepressions with relatively developed soils on crests in the alpine belt.	6150 – 90 %; 8110 – 10 %
44	*Senecioni-Juncetum trifidi; Geo-Saxifragetum cymosae; Agrostio-Seslerietum comosae festucetosum airoidis; Primulo-Salicetum herbaceae poetosum mediae; Festuco-Vaccinietum uliginosi*	Cirque slope of N exposition. Rock sea, occasionally with rock outcrops, undulating relief.	8110 – 80 %; 8220 – 10 %; 6150 – 10 %
45	*Geo-Saxifragetum cymosae; Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae caricetosum curvulae; Seslerio-Juniperetum sibiricae; Primulo-Salicetum herbaceae* typicum	Rocks and stone fields in a northern hanging cirque.	6150 – 50 %; 8110 – 40 %; 4060 – 5 %; 8220 – 5 %
46	*Primulo-Nardetum strictae; Agrostio-Seslerietum comosae caricetosum curvulae, -festucetosum airoidis; Senecioni-Juncetum trifidi; Diantho-Nardetum strictae festucetosum airoidis; Primulo deori-Caricetum nigrae*	Floor of a hanging cirque, distinct nanorelief, soils of various humidity and development.	6150 – 40 %; 7140 – 30 %; 6230 – 20 %; 8110 – 10 %
47	*Geo-Saxifragetum cymosae; Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Festuco-Vaccinietum uliginosi; Seslerio-Juniperetum sibiricae*	Rocks under a hanging cirque.	8220 – 40 %; 4070 – 20 %; 8110 – 20 %; 6150 – 15 %; 4060 – 5 %
48	*Senecioni-Juncetum trifidi; Geo-Saxifragetum cymosae; Agrostio-Seslerietum comosae caricetosum curvulae; Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum	Rocks, stone fiels, avalanche chutes in a northern hanging cirque.	8110 – 40 %; 6150 – 30 %; 8220 – 20 % 4060 – 5 %; 4070 – 5 %
49	*Agrostio-Seslerietum comosae festucetosum airoidis, caricetosum curvulae; Senecioni-Juncetum trifid*	Slope and creast with eroded soil.	6150 – 70 %; 8110 – 30 %;
51	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Festuco-Vaccinietum uliginosi; Lerchenfeldio-Pinetum mugo* typicum	Screes in a river-bed dead end.	8110 – 70 %; 6150 – 20 %; 4070 – 10 %
52	*Senecioni-Juncetum trifidi; Agrostio-Seslerietum comosae festucetosum airoidis; Festuco-Vaccinietum uliginosi; Lerchenfeldio-Pinetum mugo*	Cryonival swell	8110 – 65 %; 6150 – 20 %; 4070 – 15 %
53	*Carici-Festucetum riloensis; Agrostio-Seslerietum comosae festucetosum airoidis, -caricetosum curvulae; Campanulo-Caricetum curvulae; Festuco-Vaccinietum uliginosi; Festucetum pictae achilleetosum clusianae; Primulo- Salicetum herbaceae* typicum; *Primulo exiguae-Primuletum deori; Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Angelico-Heracleetum vericillati; Festucetum validae* typicum; *Lerchenfeldio-Pinetum mugo; Omalotheco-Alopecuretum gerardii Alopecuro (riloensis)-Ranunculetum crenati.*	Central part of the floor of the Studeniya Cirque, with sheep rocks depressions with springs, rivulets, marshy parts, screes. Greatly varied development of the soil cover. Snowdrift beds.	6150 – 40 %; 8110 – 15 %; 4070 – 10 %; 4060 – 10 % ; 6230 – 10 %; 7140 – 5 % ; 6430 – 5 %; 62D0 – 5 %
54	*Primulo exiguae-Primuletum deori; Primulo deori-Caricetum nigrae; Nardo-Caricetum bulgaricae; Primulo-Nardetum strictae; Diantho-Nardetum strictae festucetosum airoidis; Carici-Deschampsietum caespitosae; Agrostio-Seslerietum comosae caricetosum curvulae; Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo*; *Primulo-Trichoforetum caespitosae*	Lowered part of the Studeniya Cirque floor, with springs, rivulets, marshy places.	7140 – 55 %; 6230 – 20 %; 6150 – 10 %; 8110 – 10 %; 4070 – 5 %;

Table 2. Continuation.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
55	*Festuco-Vaccinietum uliginosi; Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Agrostio-Seslerietum comosae caricetosum curvulae; Lerchenfeldio-Pinetum mugo* typicum	River-bed with sheep rocks and large rock fragments at the exit of Studeniya Cirque. Soils poorly developed.	6150 – 50 %; 4070 – 20 %; 4060 – 15 %; 8110 – 15 %;
56, 56a	*Seslerio-Juniperetum sibiricae; Festuco-Juniperetum sibiricae; Agrostio-Seslerietum comosae caricetosum curvulae, -festucetosum airoidis; Festucetum validae* typicum; *Lerchenfeldio-Pinetum mugo* typicum; 56a – *Carici-Festucetum riloensis; Agrostio-Seslerietum comosae; Senecioni-Juncetum trifid; Seslerio-Caricetum bulgaricae*	Part of meridional slope with strong incline, crossed by the chutes of waterflows in 56, undulating relief, different soils.	4060 – 50 %; 6150 – 30 %; 8110 – 10 %; 4070 – 5 %; 62D0 – 5 %; 56a: 6150 – 70 %; 8110 – 30 %;
57, 57a	*Agrostio-Seslerietum comosae festucetosum airoidis; -caricetosum curvulae; Campanulo-Caricetum curvulae; Carici-Festucetum riloensis; Seslerio-Caricetum bulgaricae; Philonotido-Saxifragetum stellaris; Primulo deori-Caricetum nigrae*	Part of a meridional slope with undulating relief, moderate incline, snowdrifts, developed soil; 57a – rock rings with moderate incline, springs, snowdrifts.	6150 – 80 %; 4060 – 10 %; 7140 – 10 %;; 57a: 6150 – 85 % 8110 – 10 %; 7140 – 5 %
58, 58a	*Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Seslerio-Juniperetum sibiricae; Agrostio-Seslerietum comosae festucetosum airoidis; 58a – Senecioni-Juncetum trifidi; Carici-Festucetum riloensis*	Stone fields of rock fragments, mainly large, on a meridional slope above 2500 a.s.l. Very poorly developed soils.	8110 – 60 %; 4060 – 25 %; 6150 – 15 %; 58a – 8110 – 90 %; 6150 – 10 %;
59, 59a	*Carici-Festucetum riloensis* typicum*; Agrostio-Seslerietum comosae; Senecioni-Juncetum trifidi* *59a – Festuco-Caricetum rupestris; Carici-Festucetum riloensis* typicum, *-minuartetosum orbelicae; Senecioni-Juncetum trifidi; Festuco-Vaccinietum uliginosi; Agrostio-Seslerietum comosae*	Stony slope with S exposition, 25–30° incline. Different soils, 59a – slightly inclined area with W exposition and in places developed soil cover.	59 – 6150 – 70 %; 8110 – 30 % 59a – 6150 – 60 %; 8110 – 40 %
60	*Omalotheco-Polytrichetum piliferi; Omalotheco-Alopecuretum gerardii; Agrostio-Seslerietum comosae caricetosum curvulae*	Undulating relief with conditions for snowdrifts under the crest, shallow soil.	8110 – 60 %; 6150 – 40 %
62	*Senecioni-Juncetum trifidi; Carici-Festucetum riloensis minuartetosum; Alopecuro* (*riloensis*)*-Ranunculetum crenati*	Stone rings on a northern slope, uplifted relief, strong erosion.	8110 – 50 %; 6150 – 50 %
63, 63a	*Senecioni-Juncetum trifidi; Carici-Festucetum riloensis minuartetosum; Festuco-Caricetum rupestris; Festuco-Vaccinietum uliginosi;*	Stone fields (63a ridge) above 2500 m a.s.l.	8110 –90 %; 6150 – 10 %; в 63a: 8110 – 70 %; 6150 -30 %
64	*Carici-Festucetum riloensis; Agrostio-Seslerietum comosae; Senecioni-Juncetum trifidi; Geo-Saxifragetum cymosae*	Stone fields above 2500 m a.s.l., chutes, rock outcrops. Poorly developed soils.	6150 – 55 %; 8110 – 35 %; 8220 – 10 %
65	*Carici-Festucetum riloensis*; *Agrostio-Seslerietum comosae; Senecioni-Juncetum trifidi; Festuco-Vaccinietum uliginosi; Primulo-Salicetum herbaceae* typicum*; Festuco-Caricetum rupestris; Seslerio-Caricetum bulgaricae; Lerchenfeldio-Pinetum mugo; Seslerio-Juniperetum sibiricae*	Stone fields above 2500 m a.s.l. Poorly developed soils. 65a – uplifted relief.	6150 – 50 % 8110 – 30 %; 4070 – 15 %; 4060 – 5 %; 65a – 6150 – 80 %; 8110 – 20 %
66	*Agrostio-Seslerietum comosae festucetosum airoidis Festuco-Caricetum rupestris; Seslerio-Juniperetum sibiricae;* comm.of the *Carex tricolor; C. ericetorum*	Crest and upper part of slope slightly inclined N and W. Developed or eroded soils.	6150 – 100 %;
67, 73	*Festuco-Caricetum rupestris; Agrostio-Seslerietum comosae festucetosum airoidis; Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo cetrarietosum islandicae; Senecioni-Juncetum trifidi*	Levlled stony crests, at about 2500 m a.s.l. Slightly expressed nanorelief. Mainly shallow soils.	4070 – 55 %; 6150 – 30 %; 4060 – 10 %; 8110 – 5 %
69	*Senecioni-Juncetum trifidi; Primulo-Salicetum herbaceae typicum, -poetosum mediae; Festuco-Caricetum rupestris; Festuco-Vaccinietum uliginosi; Agrostio-Seslerietum comosae caricetosum curvulae; Festucetum pictae achilleetosum clusianae*	Back of cirque with N orientation. Stone fields, with soils and vegetation with a different degree of development.	8110 – 25 %; 6150 – 70 %; 6230 – 5 %
70	*Senecioni-Juncetum trifidi; Oxyrio dyginae-Poetum contractae; Festucetum pictae achilleetosum clusianae; Alopecuro (riloensis)-Ranunculetum crenati; Geo-Saxifragetum cymosae; Festuco-Vaccinietum uliginosi; Festucetum validae* typicum*; Lerchenfeldio-Pinetum mugo* typicum; *Festuceto-Juniperetum sibiricae*	Rocky and stony terrains, strongly inclined. Poorly developed soils.	4070 – 40 %; 8110 – 25 %; 8220 – 15 %; 62D0 – 15 %; 4060 – 5 %
71	*Senecioni-Juncetum trifidi; Festucetum validae* typicum; *Lerchenfeldio-Pinetum mugo* typicum; *Festuceto-Juniperetum sibiricae*	Cryonival niche, stone fields at the foot of stony slope.	8110 60 %; 4070 – 20 %; 62D0 – 15 %; 4060 – 5 %
72	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum; *Festucetum pictae achilleetosum clusianae; Festucetum validae typicum*	Cryonival swells	8110 – 50 %; 4070 – 40 %; 62D0 – 10 %
74	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo cetrarietosum islandicae; Festuco-Caricetum rupestris; Seslerio-Juniperetum sibiricae*	Stone fields. Poorly developed soil cover and vegetation.	8110 – 70 %; 4070 – 15 %; 6150 – 10 %; 4060 – 5 %

Table 2. Continuation.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
75, 75a	*Carici-Festucetum riloensis; Senecioni-Juncetum trifidi; Festuco-Vaccinietum uliginosi;* 75a – *Agrostio-Seslerietum comosae; Seslerio-Caricetum bulgaricae; Achilleo (clusianae)-Luzuletum velenovskyi*	Uplifted rocky area with a slight incline; 75a – depression with springs.	8110 – 85 %; 6150 – 15 %; 75a: 6150 – 50 %; 8110 – 25 %; 7140 – 25 %
76	*Lerchenfeldio-Pinetum mugo* typicum, *-cetrarietosum islandicae; Geo-Saxifragetum cymosae; Senecioni-Juncetum trifidi; Festucetum pictae achilleetosum clusianae; Achilleo (clusianae)-Luzuletum velenovskyi*	Rock complex with W exposition, with vertical or strongly inclined walls.	4070 – 60 %; 8220 – 30 % 8110 – 10 %;
77	*Lerchenfeldio-Pinetum mugo* typicum, *-cetrarietosum islandicae; Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Agrostio-Seslerietum comosae festucetosum airoidis; Festucetum validae typicum; Diantho-Nardetum strictae (2 %)*	Part of slope, WNW between the alpine and subalpine belts. Slight incline, screes, mainly poorly developed soil.	4070 – 40 %; 6150 – 30 %; 4060 – 10 %; 62D0 –10 %; 8110 – 10 %
79	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Festucetum validae* typicum; *Agrostio-Seslerietum comosae*	Part of slope with W exposition, very stony, poorly to moderately developed soil.	4070 – 50 %; 8110 – 30 %; 62D0 – 10 %; 6150 – 10 %
80	*Lerchenfeldio-Pinetum mugo* typicum; *Geo-Saxifragetum cymosae; Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Festucetum validae* typicum	Slope with considerable W incline, moderately developed soils.	4070 – 80 %; 8220 5 %; 8110 – 5 %; 62D0 – 5 %; 4060 – 5 %
81	*Geo-Saxifragetum cymosae; Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Festucetum validae* typicum	Rock complex and stone fields on slope with W exposition. Poorly developed soils.	8220 – 40 %; 4070 – 305; 8110 – 10 %; 62D0 – 10 %
82	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum; *Seslerio-Juniperetum sibiricae; Festucetum validae* typicum; *Festucetum pictae achilleetosum clusianae*	Stone fields at the foot of a rocky slope.	8110 – 65 %; 62D0 – 15 %; 4070 – 15 %; 4060 – 5 %
83	*Diantho-Nardetum strictae* typicum, *-festucetosum airoidis; Agrostio-Seslerietum comosae antennarietosum dioicae; Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Seslerio-Juniperetum sibiricae; Festucetum validae* typicum;	Lateral moraine, scree tongues, distinct nano-relief with W exposition and moderate incline, domination of poorly developed soils.	6230 – 40 %; 6150 – 10 %; 4070 – 30 %; 4060 – 10 %; 8110 – 10 %
84	*Diantho-Nardetum strictae* typicum, *-festucetosum airoidis; Agrostio-Seslerietum comosae antennarietosum dioicae; Lerchenfeldio-Pinetum mugo* typicum; *Seslerio-Juniperetum sibiricae*	Elevated part of a riverside terrace, distinct nanorelief, well developed soils, moderately humid.	6230 – 70 %; 4070 – 10 %; 6150 – 10 %; 4060 – 10 %
85	*Diantho-Nardetum strictae* typicum, *-festucetosum airoidis; Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae; Carici-Deschampsietum caespitosae; Alopecuro-Plantaginetum gentianoidis*	Levelled cirque floor, depression on a riverside terrace. Deep, well-moistened soil, underground waters occasionally close to the surface.	6230 – 80 %; 7140 – 15 %; 6430 – 5 %
86	*Lerchenfeldio-Pinetum mugo* typicum; *Diantho-Nardetum strictae* typicum; *Festucetum pictae achilleetosum clusianae*	Stadial moraine. Rounded relief. Mountin-meadow, dry, stony, not very deep soil.	4070 – 50 %; 6230 – 30 %; 8110 – 20 %
87	*Lerchenfeldio-Pinetum mugo* typicum; *Diantho-Nardetum strictae festucetosum airoidis; Senecioni-Juncetum trifidi; Campanulo-Juniperetum sibiricae; Festucetum validae* typicum; *Angelico-Heracleetum verticillati; Carici-Deschampsietum caespitosae*	Levelled to strongly inclined area, with distinct nano- and mesorelief, different in depth soils, considerable anthropogenic impact.	4070 – 60 %; 6230 – 20 %; 6430 – 10 %; 4060 – 5 %; 8110 – 5 %;
88	*Lerchenfeldio-Pinetum mugo* typicum; *Geo-Saxifragetum cymosae; Senecioni-Juncetum trifidi*	Rock complex and stone fields, considerable incline, poorly developed soils.	4070 – 70 %; 8220 – 20 %; 8110 – 10 %
89	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum	Part of NW slope with a strong incline, stone fields.	8110 – 50 %; 4070 – 50 %;
90	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Campanulo-Juniperetum sibiricae; Angelico-Heracleetum verticillati; Carici-Deschampsietum caespitosae; Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae*	Stony riverside area, with differently developed and moisturized soils. Anthropogenic impact.	4070 – 40 %; 8110 – 20 %; 6430 – 29 %; 7140 – 15 %; 4060 – 5 %;
91	*Lerchenfeldio-Pinetum mugo* typicum; *Campanulo-Juniperetum sibiricae; Angelico-Heracleetum verticillati; Carici-Deschampsietum caespitosae; Agrostio-Seslerietum comosae festucetosum airoidis*	E exposed slope, moderate to considerable incline, medium developed soils, strong anthropogenic impact.	4070 – 60 %; 4060 – 10 %; 6430 – 10 %; 6150 – 20 %
92	*Lerchenfeldio-Pinetum mugo eriophoretosum vaginati; Primulo deori-Caricetum nigrae; Primulo-Nardetum strictae; Primulo exiguae-Primuletum deori; Philonotido-Saxifragetum stellaris*	Cirque floor, springs, marshy area with distinct nanorelief.	91D0 – 50 %; 7140 – 50 %

Table 2. Continuation.

Polygon No	Mapping units of the vegetation cover	Geomorphological characteristics	Mapping units of habitat types in % from the polygon area
93	*Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae; Angelico-Heracleetum verticillati; Carici-Deschampsietum caespitosae; Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo eriophoretosum vaginati*	Marshy area crossed by waterflows coming from avalanche cones. Young meadow-marsh soil.	7140 – 80 %; 6430 – 10 %; 91D0 – 10 %
94	*Lerchenfeldio-Pinetum mugo* typicum; *Campanulo-Juniperetum sibiricae; Diantho-Nardetum strictae* typicum; *Festucetum pictae achilleetosum clusianae;* *Senecioni-Juncetum trifidi; Angelico-Heracleetum verticillati*	Moderately inclined slope with NNE exposition. Differently developed soils.	4070 – 60 %; 6230 – 20 %; 4060 – 10 %; 8110 – 5 %; 6430 – 5 %
95	*Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo typicum; Festucetum pictae achilleetosum clusianae; Achilleo (clusianae)-Luzuletum velenovskyi; Alopecuro (riloensis)-Ranunculetum crenati; Festucetum validae; Campanulo-Juniperetum sibiricae; Carici-Deschampsietum caespitosae; Angelico-Heracleetum verticillati*	Screes of weathered material of various size. Avalanche chutes and cones. Exposition NNW. Very pooly developed soils. Undulating relief.	8110 – 65 %; 4070 – 15 %; 62D0 – 10 %; 4060 – 5 %; 6430 – 5 %
96	*Diantho-Nardetum strictae* typicum; *Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae; Primulo exiguae-Primuletum deori ; Nardo-Caricetum bulgaricae; Agrostio-Seslerietum comosae festucetosum airoidis, -caricetosum curvulae, -antennarietosum dioicae; Senecioni-Juncetum trifidi; Campanulo-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum; *Sileno lerchenfeldianae-Potentilletum haynaldianae*	Stadial moraine, 12 000–14 000 BP. Levelled relief with nano-depressions up to 5–6 m, with developed meadow-marshy soils, including large rock blocs covering up to 25 % of the area. Old marshy river bed.	6230 – 40 %; 7140 – 30 %; 615020 %;40605 %;4070–4 %; 8220 – 1 %
97	*Diantho-Nardetum strictae* typicum; *Primulo deori-Caricetum nigrae; Campanulo-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum; *Festucetum pictae achilleetosum clusianae; Senecioni-Juncetum trifidi; Alopecuro-Plantaginetum atratae*	Parts of stone fields at the foot of a rocky slope close to the lakes, with relatively developed humid soils.	6230 – 40 %; 8110 – 25 %; 4060 – 15 %; 4070 – 10 %; 7140 – 10 %;
98	*Diantho-Nardetum strictae typicum, -festucetosum airoidis;Campanulo-Juniperetum sibiricae; Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum; *Festucetum pictae achilleetosum clusiana*	Mainly levelled terrain with two shallow, drying-up lakes. Differently developed soils.	6230 – 70 %; 8110 – 20 %; 4060 – 10 %; 4070 – 10 %;
99	*Primulo-Nardetum strictae; Primulo deori-Caricetum nigrae; Primulo exiguae-Primuletum deori ; Nardo-Caricetum bulgaricae; Diantho-Nardetum strictae* typicum; *Lerchenfeldio-Pinetum mugo* typicum; *-eriophoretosum vaginati*	Lower levelled part of a slope with springs and marshy places. Soils mainly meadow-marshy.	7140 – 70 %; 6230 – 10 %; 4070 – 10 %; 91D0 – 10 %
100	*Lerchenfeldio-Pinetum mugo* typicum; *Festucetum validae* typicum; *Diantho-Nardetum strictae* typicum; *Campanulo-Juniperetum sibiricae; Festucetum pictae achilleetosum clusianae; Senecioni-Juncetum trifidi; Alopecuro (riloensis)-Ranunculetum crenati*	Moderately inclined ENE, occasionally stony slope. Undulating relief. Differently developed soils.	4070 – 50 %; 62D0 – 15 %; 8110 – 15 %; 6230 – 10 %; 4060 – 10 %
101	*Sileno lerchenfeldianae-Potentilletum haynaldianae Agrostio-Seslerietum comosae festucetosum airoidis; Festucetum validae* typicum; *Omalotheco-Alopecuretum gerardii; Senecioni-Juncetum trifidi; Lerchenfeldio-Pinetum mugo* typicum	S oriented back of a cirque. Rock ribs and chutes. Insignificantly developed soils.	8110 – 40 %; 8220 – 20 %; 6150 – 20 %; 62D0 – 15 %; 4070 5 %
102	*Festucetum validae typicum; Senecioni-Juncetum trifidi*	Cirque floor. Differently developed soilos.	62D0 – 70 %; 8110 – 30 %
103	*Lerchenfeldio-Pinetum mugo* typicum, *Carici-Deschampsietum caespitosae; Angelico-Heracleetum verticillati*	Riverside areas, differently developed and moisturized soils.	4070 – 90 %; 6430 – 10 %
104	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi*	Moderately inclined W slope, occasionally stony.	4070 – 90 %; 8110 – 10 %
105	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Angelico-Heracleetum verticillati*	Cirque floor with stony fields. Differently developed soils.	4070 – 70 %; 8110 – 20 %; 6430 – 10 %
106	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi; Angelico-Heracleetum verticillati; Festucetum validae* typicum; *Primulo deori-Caricetum nigrae; Campanulo-Juniperetum sibiricae*	Mainly slightly inclined slope with stone fields, springs and differently developed soils.	4070 – 50 %; 8110 – 35 %; 62D0 – 5 %; 6430 – 5 %; 7140 – 5 %;
107	*Lerchenfeldio-Pinetum mugo* typicum; *Senecioni-Juncetum trifidi Sileno lerchenfeldianae-Potentilletum haynaldianae; Alopecuro-Ranunculetum crenati*	Part of slope with different incline, rock outcrops and stone fields.	4070 – 60 %; 8110 – 30 %; 8220 – 10 %;
109	*Senecioni-Juncetum trifidi; Carici-Festucetum riloensis; Seslerio-Juniperetum sibiricae; Alopecuro (riloensis)- Ranunculetum crenati; Primulo-Salicetum herbaceae typicum; Oxyrio dyginae-Poetum contractae*	Slopes and cirque floor with rock humps and stone fields. Poorly developed soils.	8110 – 65 %; 6150 – 30 %; 4060 – 5 %
110	*Senecioni-Juncetum trifidi; Carici-Festucetum riloensis; Seslerio-Juniperetum sibiricae; Lerchenfeldio-Pinetum mugo* typicum	Steep rocky and stony slope, W oriented. Poorly developed soils.	8110 – 50 %; 6150 – 30 %; 4070 – 10 %; 4060 10 %

*** Unformed phytocoenoses, groups of many plant species without distinct dominants.**

Results and discussion

The rocks in Rila are strongly cracked, so there are few sheer or very steep rock walls, almost or completely deprived of vegetation, especially if large in area. The numerous crevices, grooves and small terraces in the rocks encourage the development of different plant species, and often even formation of phytocoenoses. Besides the typical chasmophytes, almost all other species in the region occur also on the rock outcrops. Even *Primula deorum* Velen., which is one of the major specis in the high-moutain marshes of the Rila Mts, could be found in sufficiently wet rock fissures or grooves. The two associations identified so far, which still cannot give a full general account of the vast phytocoenotic diversity of chasmophyte vegetation from the alliance *Silenion lerchenfeldianae*, are represented by the habitat type, code 8220 under NATURA 2000 – Siliceous Rocky Slopes with Chasmophytic Vegetation (Table 1).

The screes are represented by the habitat type: Siliceous Scree of the Montane to Snow Levels, code 8110 (Table 1). They are a major element of the relief in the high-mountain parts, but also one of the most complicated in terms of plant groups and their syndynamic orientation. They occur not only at the foot of slopes, but also on the very slopes, mountain crests and peaks, as well as in the cirques. They have different incline or no incline whatsoever. The evolutionary processes in plant vegetation in many of them are in their initial stage, while their sydynamic orientation depends on a number of extra factors. The granulometry of their compositon varies strongly: from fine pebbles to rock blocks measuring up in metres. It certainly influences the floristic composition of this habitat type. Screes of medium or small-size wethering material localized in the alpine belt and along the border with the subalpine belt are often colonized by serial communities of the association *Oxyrio dyginae-Poetum contractae* of *Androsacion alpinae,* or *Alopecuro (riloensis)-Ranunculetum crenati, Primulo-Salicetum herbaceae typicum* and *Alopecuretum riloensis typicum* of the alliance *Salicion herbaceae*, if they appear in the place of snowdrifts; and by *Omalotheco-Alopecuretum gerardii* from the latter cited alliance, but mainly with meridional exposition. The association *Achilleo (clusianae)-Luzuletum velenovskyi* is formed in stony areas, mainly along brooks on very steep slopes, and is also part of that habitat type. In the screes with larger rock fragments, the association *Senecioni-Juncetum trifidi* of *Androsacion alpinae* is mainly represented, distributed predominantly in the alpine belt. At altitudes below 2500 m and meridional exposition, serial communities develop in them aiming at the establishment of shrub phytocoenoses (Dwarf Pine – habitat 4070 and Juniper – habitat 4060), or grassy species from the alliance *Poion violaceae* referred to habitat 62D0. The serial phytocoenoses belong to the alliance *Festucion pictae* and often their vegetation projection cover exceeds 30–40 %, thus pushing the screes into a stabilised and immovable stage and making their referral to a specific syntaxon and habitat type very problematic. Subassociation *Festucetum pictae achilleetosum clusianae* is referred chiefly to the screes. Referral of a given syntaxon to a respective habitat type has been also guided by the syndynamics of vegetation. That is why subassociation *Primulo-Salicetum herbaceae typicum* is refered to the habitat Siliceous Alpine and Boreal Grasslands (6150), while *-poetosum mediae* is refered to habitat 6230 – *Species-Rich Nardus Grassland. Three more basic sytaxa from *Salicetea herbacea* are referred to the habitat type 6230. Their phytocoenoses mostly form in the depressed parts of the relief, with, as a rule, considerable vegetatin projection cover and syndynamic orientation rather to the alliance *Potentillo (ternatae)-Nardion.* Thus various syntaxa of *Salicion herbaceae* participate in the composition of three different habitat types. Their concrete areas are widely distributed in the mountains and take part in the composition of many polygons. There are many terrains in the Rila Mts, where granulometry, exposition, serial communities, and syndynamic processes in the screes are so intertwined that it is quite a puzzle to determine the habitat type. One of the typical examples occurs on the northern slopes of peaks Lovnitsa and Golyam Kupen (Roussakova-Anastassova 1978), as well on the slopes of river Dupnishka Bistritsa, under Ivan Vazov chalet. In our study area, there are such scree types in polygons 1, 5, 6, etc.

Dynamic processes are strongly delayed in the development of vegetation on screes subject to strong erosion and/or often supplemented with new weathering material. The serial phytocoenoses described in 1971 in Polygon 14 occupied an insignificant area of the terrain, but still showed some marked intital stages of the development of plant cover. In 1996 none of them could be found and 15 years later there were only single individuals among the rocks. That called for setting up two adjacent polygons on the northern slope of Peak Irechek. Polygon 12 is not subject to the delaying impact of lengthy lingering of snow masses on the sydynamics, contrary to Polygon 14, which is close to the cirque floor at 2500 m a.s.l., where a lot of snow lingers. The different vegetation projection cover in the two areas has been so far the reason for differentiating two polygons for vegetation mapping, but both belong to one and the same habitat type – 8110 and, therefore, should share a general polygon on the map. There are such cases in other polygons too, predominantly presented by subunits.

The various associations and their subassociations in the alpine belt maintain a comlex relationship with the habitat types and their structure and distribution. In the alpine belt, six basic syntaxa have been differentiated in the alliance *Seslerion comosae,* referred to the general habitat type 6150 – Siliceous Alpine and Boreal Grasslands. While mapping the vegetation cover, the different polygons have been set in compliance with the dominating syntaxon in area. The role of some substitute environmental factors extends the distribution of some phytocoenoses from the alpine bealt below its boundary with the upper subalpine sub-belt. In coenoses with dominance of *Carex curvula* All., these are mainly places with snowdrifts. In case of *Sesleria comosa* Velen., a species with a wide ecological amplitude, moderate moisture and well-developed slightly packed soil cover makes it dominate in the coenoses of these species even under the boundary of the alpine belt. *Agrostis rupestris* All. requires uplifted relief with eroded shallow soil cover for its development. In such places this species may form phytocoenoses even at altitudes of 2000 m. In the subalpine belt, *Festuca airoides* Lam. is often co-/subdominant in the association of *Diantho-Nardetum strictae*. Syndynamic orientation of many of these coenoses is problematic, but generally depends on altitude, i.e. on the vegetation belt in which they are localized. They usually cover a small area, which permits their featuring on maps of a very large scale. In the course of the present mapping, they often fell into the composition of polygons localized in the subalpine belt. In contrast, the communities of *Vaccinium uliginosum* L. of the class *Loiseleurio-Vaccinietea* are refered to habitat 4060. Being localized mostly in the alpine belt, they have alpine floristic composition and, as a rule, too small an area for individual featuring on the map (Roussakova, 1974, Roussakova-Anastassova 1977).

The alliance *Poion violaceae* is represented in the region by two associations, one of which *Festucetum paniculatae* was identified on an insignificant area only in one terrain of the study area. They are referred to the habitat type 62D0 – Oro-Moesian Acidophilous Grasslands. Generally for the mountain, they are some of the main polygon components on the slopes with meridional exposition and occasionally could be presented as independent mapping units.

The glacial relief of the study area does not presume any wide distribution of the alliance *Potentillo (ternatae)-Nardion*. It is represented by four basic syntaxa, three of which referred without any problem to the habitat type 6230 – *Species-Rich Nardus Grasslands. Association *Seslerio-Caricetum bulgaricae* is often localized along the border with alpine vegetation, and that is why in the Table it is refered to habitat 6150, but at lower altitudes it is rather referred dynamically to *Potentillo (ternatae)-Nardion.* The relationship of its areas with one or another habitat type is decided by the concrete situation. Similar is the situation of groups of *Poa media* Schur. As they not occur frequently, at least not in the study area, they are of no particular interest.

The problem of lake-silting and replacement of hygrophilous with mesophilous vegetation in the mires and along springs is of great scientific and social importance. The existence of many springs and mires dates long back and the syndynamic processes in them unfold relatively slowly. However, many of them are vanishing, or have already vanished. The two alliances *Caricion nigrae* and *Cardamino-Montion* are mostly linked territorially and their three associations are referred to habitat 7140 – Transition Mires and Quaking Bogs. They contribute considerably to landscape diversity in the study area, although often representing only parts of one or another polygon.

Tall herb phytocoenoses and, respectively, their syntaxa of the alliance *Cirsion appendiculati* are not rare in the region and represent relatively well habitat 6430 – Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels, although by linear area (small enough, if not always linear) they cannot be mapped independently, but as a part of one or another complex polygon. Owing to disappearance of sheep pens in recent years, the ruderal coenoses with dominance of *Rumex alpinus* L. have gone to other coenoses.

The coenoses of *Pinus mugo* Turra and *Juniperus sibirica* Burgsd. are part of the alliance *Pinion mugo*. Taking out the Juniper syntaxa from that alliance does not seem very productive, although the two groups of basic syntaxa belong to two different habitat types: 4070 – *Bushes with *Pinus mugo* and *Rhododendron hirsutum* and 4060 – Alpine and Boreal Heaths. Both types are widely distributed in the region and often are linked spatially and dynamically, and only above 2600 m a.s.l. Juniper occurs occasionally in an association *Seslerio- Juniperetum sibiricae,* while the fragments of Dwarf Pine phytocoenoses have disappeared almost completely. The only exception makes subassociation *Lerchenfeldio-Pinetum mugo eriophoretosum vaginati* refered to the specific habitat 91D0 – *Bog Woodland and, as elsewhere in Rila, it is represented in a rather limited way in the sudy area.

Analysis has shown that in most cases a certain habitat type corresponds to a certain alliance from the syntaxonomic classification scheme. Actually, the alliances have become basic taxa in the differentiation of polygons during habitat mapping. The alliance *Salicion herbaceae*, however, makes an exclusion and its basic syntaxa relate to different types of habitats. There are few other exceptions from this rule.

Three typical alpine basic syntaxa, each in a different polygon (Nos 41, 42, 43 – Map 1, Table 2), dominate on the ridge between Peak Studen Rid from the south and Peak Deno from the north. They fall into the same habitat type – 6150, that is why during habitat mapping, being adjacent, they should be put into one and the same polygon. Vegetation in the lower part of a slope of Peak Deno, with incline of 30° and southern exposition (Polygon 59), is mostly represented by the same syntaxa as in the three preceding polygons, but part of the phytocoenoses are of the serial type. Furthermore, most of the area is covered by screes with large rock fragments, contrary to the other polygons discussed here, where the screes are of finer weathering material and cover insignificant areas. That is why a separate polygon has been set up here. A slighter incline in 59a, close to the peak, conditions the development of a more distinct alpine vegetation, albeit different from that in polygons 41, 42 and 43 by the dominating association *Festuco-Caricetum rupestris* in that area. A soil core taken in that community at 2790 m a.s.l. has revealed a surpirsing soil depth of 60 cm. In such areas, subject to strong wind erosion and denuding by precipitation and suffosion processes, soils are usually 25–30 cm thick. Being a typical mountain-meadow soil, it should have two horizons, while in our example we have distinguished clearly four horizons. Besides, the third horizon has had a good hummus composition and iron oxides incorporated by secondary deposits. The plants root system has reached 40 cm in depth. The phytocoenoses dominated strongly by *Carex rupestris* All. and occurring only in that region on silicate, are obviously relict. These specificities of the soil on which they were formed give rise to questions, as well as the fact that on the north-exposed slope of Peak Deno, in places almost entirely occupied by screes and bare of vegetation, there have been fragments of phytocoenoses of *Carex rupestris,* whose soil cover obviously spreads further below the large rock fragments of the screes. The crest of Peak Deno had probably always stayed above the glaciers during Quarternary glaciations. Possibly, only the cryogene processes might have operated on it, while the development of soils might have been uninterrupted by the glaciers? Was it possible that all forms of the relief in polygons 58, 59, 61, 62, 63, 64, 65, and 75 were no older than the period of glaciation in Europe? Probably as a result of this on Peak Deno, on its slopes and the adjacent ridges there are many phytocoenoses of *Festuco-Caricetum rupestris* and *Minuartia recurva* (All.) Schinz & Thell. ssp. *orbelica* (Velen.) Koz. & Kuz., *Lloydia serotina* (L.) Reichenb. *Saxifraga retusa* Gouan, *Silene acaulis* (L.) Jacq. ssp. *brioides* (Jordan) Nyman and other rare species for the Bulgarian flora, as well as plenty of boreal elements.

Exposed to strong winds, owing to their great altitude (between 2700 m and 2800 m), the peaks Irechek, Studen Rid and Deno are covered by screes of large rock fragments. Association *Senecioni-Juncetum trifidi* occupies most of the area in the polygons. On Deno and Studen Rid, stone fields occupy most of the slopes too (polygons 62, 63, 75, 58, 20, 21, 44, 45, 48, 50, 109, 19, 14, and 71). In terms of vegetation cover, the different polygons were set depending on the correlation of areas covered by scree and by alpine grassy syntaxa. Nevertheless, as mapping units of habitat types, the adjacent polygons with domination of 8110 should be merged into one polygon. From the southeast, Peak Irechek has a slight incline in its uppermost part, an area comparatively protected from the strong winds, where along with the specificity of exposition some relatively more favourable conditions have been created for the development of vegetation represented mainly by fragments of serial alpine communities (Polygon 17). A similar situation obtains to a certain extent in polygons 20, 27, 30, 33, etc., as wll as on many cirque slopes. In Polygon 64, on the western slope of Deno, areas with rock fragments bare of vegetation alternate with alpine phytocoenoses. Such a striped pattern, as on the slopes of Peak Deno, could be seen in other parts of the mountain: the western-exposed slopes of peaks Musala and Aleko, etc. There are many screes with phytocoenoses of *Senecioni-Juncetum trifidi* on the slopes of the river valleys (at respective altitudes). They supplement the wide distribution of these syntaxa and habitat type (8110) in the region, rather natural for its glacial relief. In some cirques (northwards from Peak Musala and eastwards from peaks Malka Musala and Irechek, and northwards from Peak Irechek), on the slopes and on their floors, there are considerble areas occupied by screes with little vegetation, mainly from alliances of *Salicion herbaceae* or *Androsacion alpinae* (polygons 12, 14, 109, 30, 33, 45).

At the border between alpine and subalpine belts, the encroachment of alpine phytocoenoses into the subalpine belt (and vice versa) gives rise to problems in polygon setting. If the area of such phytocoenoses is too small to present them independently on the map scale, they fall into one and the same polygon with phytocoenoses and habitats typical of the subalpine belt (and vice versa). Most typical here is the case of the southern slope of Peak Angelov (on the southern macro-slope of the mountain).

Rock outcrops represented by the basic syntaxa of *Silenion lerchenfeldianae* and 8220 – Siliceous Rocky Slopes with Chasmophytic Vegetation have been put in the polygons 16, 35 and 108, and when their area is too small, they are entered in the compositon of other polygons. Frequently, the rock outcrops are untypical: they seldom reach 3–4 m in height (for instance, in the lower part of polygons 5, 6, 64, etc.).

Polygons located in the valley of rivers Musalenska Bistritsa and Soleni Dol give an idea of the distributiobn of syntaxa and habitat types in the trough valleys of the Rila Mts. Dwarf Pine phytocoenoses play a dominating role on the slopes, accompanied by those of Siberian Juniper, as part of the basic units of *Pinion mugo* and habitat types 4070 and 4060. *Festucetum validae typicum* rather than *Festucetum paniculatae* of *Poion violaceae* and other syntaxa and habitats participate with different areas in the polygons, but their participation is chiefly limited.

Riverside terraces are remarkable for duistribution of phytocoenoses of the basic syntaxa of *Potentillo (ternatae)-Nardion* (6230) and *Caricion nigrae*, often together with *Philonotido-Saxifragetum stellaris* of *Cardamino-Montion* (7140). Soil cores have revealed different types of soils. In Polygon 84, in the generally levelled relief of a ground moraine (with slight uplifts and depressions), the soil was typically mountain-meadow, well structured, medium deep, with a well-developed hummus horizon (rather eroded at nanoelevations and forming phytocoenoses chiefly of *Agrostis rupestris* there). Polygon 86, with a rounded relief, is on a stadial moraine elevated about 20 m; the soil is mountain-meadow, dry, stony, thin, lacking horizon A0. Polygon 85 is a strongly levelled cirque floor, with mountain-meadow, deep, accumulative, well-structured soil developed into an old bog. Polygon 93 has springs and a relief crossed by waterflows from avalanche chutes on the very steep neighbouring slope (Polygon 95), with occasional relief swells of avalanche cones. A core taken from a mire in a nanodepression has revealed young meadow-marsh soil. Basic syntaxa of *Potentillo (ternatae)-Nardion* dominate the area of all these polygons adjacent to the terrace of river Musalenska Bistritsa. However, their unification into one and the same polygon 6230 is obstructed by the various accompanying *Nardus* communities, as components of the vegetation and soil cover (Table 2) related to other environmental factors. Nevertheless, polygons 85 and 93 could be united with certain reserve into one on the habitat map. Polygons with similar composition and structure on riverside terraces occur in other parts of the mountain (in the spring part of the valleys of rivers Dupnishka Bistritsa, Bela Mesta, etc.).

Some Rila cirques have a very complex relief. Studen Dol cirqus is the most original of them all. Numerous rocky ridges alternate with depressions with differently developed soil cover, or spring and marshy areas. Most of the area is covered by stone fields, snowdrift beds, or places with eroded soil. In terms of altitude, this territory is referred to the alpine belt. The general expoisiton is eastern, but in terms of nano- and microrelief it is locally multidirectional. Accumulation of snowdrifts in the cirque has undoubtedly had a significant impact even presently on the development of relief and vegetation. The back of the cirque, along with the central part of its floor are set into Polygon 53, surrounded by relatively large in area depressions with springs, marshes and a small lake represented by Polygon 54. The nanorelief is very complicated there and the vegetation is represented by a large number of phytocoenoses with different dominating species: *Carex nigra* (L.) Reichenb., *Primula deorum, Nardus stricta* L., *Leontodon rilaensis* Hayek, *Carex curvula, Alopecurus riloensis* (Hackel) Pawlova, *Campanula alpina* Jacq., etc. Under a slope with southern exposition, underground waters come to the surface round the year, draining a silty bog and two canals. The soil is deep, peaty-bog. From the south, under the slope (N) of Studeni Rid, in a larger mire huddles a shallow lake. Table 2 gives the most frequent sytaxa and habitat types in both above-cited polygons, whose complex distribution in space could be mapped only on a very large scale.

This study also presents part of the Musala Cirque. The composition and structure of its vegetation cover were mapped earlier (Rusakova-Anastasova 1983) and a comparison calls for a much needed generalization of the detailed information collected on the case and its presentation via the syntaxonomic classification and habitat types under NATURA 2000. The cirques Ropalishki, Kazanchalski, Urdin, etc. are also very imprssive, and their syntaxa and taxa of habitats, even in a genralized way reveal a complex composition and structure.

Polygon 96 is a stadial moraine with vast, completely levelled spaces, but also with depressions up to 5–6 m, which comes to explain the diversity of vegetation and habitats in the area. The eastern part of the Polygon is occupied by a depression, including an old river bed with plenty hygrophilous communities on developed meadow-marshy soils. There are boulder inclusions, which occasionally crop up on the surface and claim an area of 25 %. The western part of the Polygon (96a) is more elevated, with varying in depth soil cover, here of the typical mountain-meadow type (horizon A is 24 cm deep), and, respectively, different plant cover. There are screes on the slope towards the lakes, and from the north, along the border with a more inclined area, Dwarf Pine and Juniper encroach. An enormous rock fragment in the midle of the Polygon is occupied by *Sileno lerchenfeldianae-Potentilletum haynaldianae.*

Polygon 39 is another particularly complicated one in composition and structure – an area with a slight incline SSE under some hanging cirques situated on the slopes of the highest mountain peaks. Elevated rocky ridges with leveled crests and depressed parts of the relief alternate; there is a river, a brook, some marshy places. Almost all soil types of the region are represented in that Polygon. Alpine basic syntaxa alternate with hygrophilous communities from 7140, subalpine sytaxa from 6230, and various associations of Siberian Juniper. Fragments of tall herb units (6430) also occur.

The composition, structure and size of the different polygons vary and most often relate to the relief forms. Dwarf Pine is the main climax component of the vegetation in the upper subalpine sub-belt in Rila. It is an aggressive pioneering species, with wide ecological amplitude, a strong edificator. Thanks to this, in places with slight antropogenic impact on the vegetation, or wherever it has managed to regenerate, groups of this species cover large spaces in the river beds, across the terraces and slopes, including the ridges below 2500 m a.s.l. Irrespective whether there is a more or less developed soil cover (Dwarf Pine itself is a soil-maker), whether the substrate consists of screes or rock outcrops, of the exposition and incline. In areas with cut-out or burned down Dwarf Pine in the contemporary subalpine vegetation cover there are still phytocoenoses or fragments of them, with which it participates in many complexes/polygons. At the border with the alpine belt, the syndynamic processes are strongly slowed down and the strong northwesterly winds halt its development, so its participation in the complexes is naturally limited. In many locations of destroyed Dwaf Pine, groups of Siberian Juniper have developed (4060). They often occupy large areas, although their projection cover seldom reaches 100 %, so in the polygons most often other syntaxa and habitats take part, respectively.

Along with the well developed phytocoenoses, everywhere and particularly in the high parts of the mountain, the vegetation cover comprises groups of many species, their general projection cover reaching as far as 80–90 %, but none of them lead in abundance or phytocoenotic functions. Practically, they cannot be referred to a definite sytaxon and habitat type. In such places with far from insignificant areas, the researcher must use his/her experience about the orientation of the unfolding syndynamic processes, represented by one or another habitat type. They often remain in Polygon 8110, being mostly formed in stone fields and places with small-size rock outcrops.

The eco-physiongnomical vegetation units could be synthesized into the following generalized groups: 1. chasmophytes on rock outcrops; 2. serials on screes; 2.1. large-fragmented screes and 2.2. small-size stone and pebble screes; 3. snowdrifts; 4. alpine meadows on the high crests and slopes; 5. low herb mesophilous subalpine meadows, mainly on riverside terraces; 6. tall herb xero-mesophilous and mesophilo-xerophilous subalpine meadows, mainly on slopes with meridional exposition; 7. wet habitats with hygrophilous vegetation; 8. mixed herb-and-shrub combinations; 9. subalpine tall herbs and *Alnus viridis*; 10. subalpine shrubs; 11. ruderal subalpine vegetation.

Conclusion

The concrete terrains of 45 basic syntaxa, according to the sygmatic school, are mostly represented by complex polygons with various area on a 1:25000 map. The polygons are set partially on the basis of a phytocoenotic (vegetation) and partially on a geographic (geomorphologic) principle. Each polygon differs in outlook and composition from the adjacent ones. A polygon includes the phytocoenoses from one syndynamic series or syntaxa from various serial lines, and plant groups that are not formed into phytocoenoses could be also included. A habitat type determined as a taxon for the ecological network under NATURE 2000 genrally includes the basic syntaxa of one alliance. When mapped on a specified scale, in some cases the two polygon types – of vegetation and of the habitats – may coninside, while in other cases a polygon of the habitat types may include two and more polygons on the vegetation map. This results from the considerably more generalized content of the habitat type, as compared to vegetation. They distribute in space, mainly depending on the forms of the macro- and nanorelief, which in the high parts of the mountain do change at small distances, and occasionally even change in time. The area of the different polygons varies. On the habitat type map, there are more polygons with (relatively) large areas. A lot of polygons differ in their exceptionally complex composition and structure resulting from the specificity of the high-mountain environment, now and history-wise.

The information presented in the Tables and Map invites further conclusions, depending on the purposes of its application, including for modeling of the distribution of habitat types under NATURA 2000 and for making a classification scheme of symphytocoenological units. It would be wise to start classification of the vegetation complexes after the overall mapping of habitats in the Rila Protected Area.

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