

Scrub and Grassland habitats of Besaparski Ridove Special Protection Area (Natura 2000), Southern Bulgaria: Distribution and Assessment of their Conservation Status

Rossen T. Tzonev¹, Chavdar V. Gussev², Georgi S. Popgeorgiev³

¹Department of Ecology and Environmental Protection, Faculty of Biology, Sofia University "St. Kliment Ohridski", 8 Dragan Tsankov Blvd., 1164 Sofia, Bulgaria; E-mail: rossentzonev@abv.bg

²Department of Plant and Fungal Diversity and Resources, Institute of Biodiversity and Ecosystem research, Bulgarian Academy of Sciences, Acad. Georgi Bonchev Street, Bl. 23, 1113 Sofia, Bulgaria; E-mail: chgussev@bio.bas.bg

³Bulgarian Society for the Protection of Birds, 5 Leonardo da Vinci, 4000 Plovdiv, Bulgaria; E-mail: georgi.popgeorgiev@bspb.org

Abstract: Within the territory of Besaparski Hills Natura 2000 site, four types of non-forest habitats (5210, 6210, 62A0 and 6220) were identified. The habitats were mapped and their conservation status was assessed. The conservation status of habitats 6210, 62A0 and 6220 were assessed as "Unfavourable inadequate", while habitat 5210 was assessed as "Favourable". The main threats for the habitats are the development of new quarries, overgrazing, ploughing of grasslands. The habitat 62A0 "Eastern sub-Mediterranean dry grasslands" is the most widespread in the site and it also has an important role for the preservation of the populations of rare animals (including birds) as well as of endemic and protected plants. This study highlights the importance of Besaparski Ridove Special Protection Area for the nature conservation in Bulgaria, especially with its richness of petrophytic steppes. Their protection is essential to the conservation of the biodiversity not only at the national level but also as representative habitats for the Balkans and Europe.

Keywords: Bird Directive, mapping, plant communities, human activities

Introduction

Besaparski Ridove is a territory included in a Special Protection Area (SPA) designated in Natura 2000 network according to the Directive 2009/147 (Bird Directive) of the European Commission. It is overlapping the Site of Community Importance of Directive 92/43 (Habitat Directive) (BG0000254 "Besaparski Vazvishenia"). The site is located in the foothills between the Western Rhodopes and the south-western part of the Thracian Valley. The area consists of low elevated (350–536 m a.s.l.), mainly woodless hills on limestone rock base. The vegetation is represented mostly by diverse grasslands. The present study is focused on non-forest habitats, i.e. shrubs and grasslands included in the Annex 1 of the Habitats Directive distributed in Besaparski Ridove SPA (BG0002057). The diversity of grasslands depends of the regional conditions (karstic terrain and

transitional Mediterranean climate) and the origin of the vegetation. However, very important factors are the human activities in the area, i.e. grazing, mowing, the nitrification of the soils due to overgrazing, abandonment of former pastures and meadows and the regeneration of shrub and forest communities. A working hypothesis that the land use is predetermined by the orographic characteristics, soil depth, deflation index and degree of soil moisture was adopted for the grassland identification. It should be emphasized that the mapping of natural habitats was done in the SPA territory and not in the SCI territory. However, SCI BG0000254 "Besaparski Vazvishenia" almost entirely falls within Besaparski Ridove (SPA BG0002057). In this sense, the results of this work can also be used for the preparation of a management plan for the SCI. Although the bird habitats are the target object

of SPA, they are the same types as in SCI and the same habitats must be protected and maintained in a favourable conservation status.

The grassland communities of Bessaparski Ridove SPA were well studied by the dominant methodology (VELCHEV *et al.* 1969) but not according to Braun-Blanquet's method. The studies by STANEV (1975, 1976, 1977a, b, 1979, 1980, 1986) were also performed in this area using the dominant method. The main vegetation types of herbaceous vegetation were studied and their ecological and floristic characteristics were described. A floristic analysis of the area was also completed. Many rare, endangered and endemic species were found and their localities were described. The forest habitats were studied in the frames of the present project (DIMITROV, PETROVA, 2014).

The natural value of the floristic and faunistic complexes of Besaparski Ridove has been described in the book by ANGELOVA *et al.* (2008).

Material and Methods

The fieldwork was carried out during the summer of 2008 (July – September). Preliminary work maps

were prepared using cadastral maps, maps of forestry management plans and raster topographic maps, to distinguish the potential polygons of the non-forest habitats. For the legend, the following units of the cadastral maps nomenclature were selected: 2121 Barren fields, 2212 Mountain meadows, 2260 Forest pastures, 1310 Usable meadow; 1300 Meadows, 2200 Non-wood forest fit area, 2226 Non-forestry-fit barren area, 1401 Pastures with shrubs, 1400 Pastures and 2221 Meadows. From the forestry layers, the following types of subdivisions were selected: 9 Barren fields, 10 Pastures in the Forest Fond, 11 and 12 Meadows, 20 Non-forestry-fit fields, 21 Non-forestry fit areas, 85 Pasture around the villages and 86 Alpine pastures. The minimum area unit of mapping was 400 m².

The registered phytocoenoses polygons are localized by their UTM coordinates taken by a hand-held GPS receiver (accuracy ±5 m, Garmin, Olathe, Kansas). During several field visits over a network of routes and measuring by GPS coordinates the characteristic points of the habitats, an inventory of the composition, structure, condition and range of habitats and terrain model was drawn on the paper working cards. The gathered information was digi-

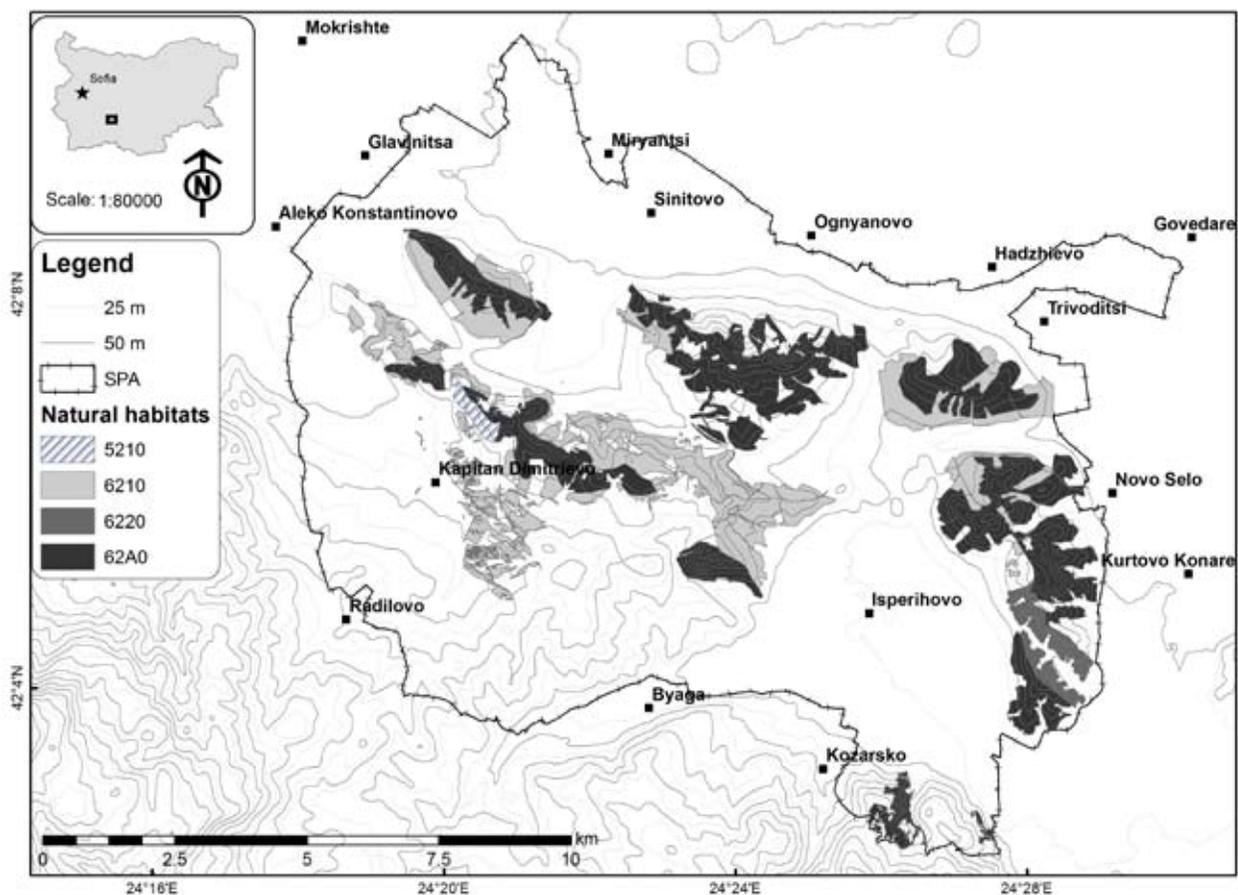


Fig. 1. Map of the open habitats in Bessaparski ridove Special Protection Area

Table 1. Summary matrix for assessing FCS of open habitats occurred in the "Bessaparski Ridove" SPA (BG0002057)

| Habitats | | 6210 | 6220 | 62A0 | 5210 |
|--|---|--|---|--|---|
| Criteria & Parameters | Measurable units/FCS threshold for assessing the condition of parts / | 1 | 2 | 3 | 4 |
| Parameter 1.1. Area covered within site | Hectares | 1185.635 | 120.2676 | 1652.397 | 33.3884 |
| Parameter 2.1. Not fragmented ecotone area | % from the length of the whole ecotone in the site | Absence of threat | Absence of threat | The 5–10% of polygons have borders with active quarries | Absence of threat |
| Parameters 2.2. Fragmentation in the polygons | Ye/No in the polygons | Absence of threat | Absence of threat | There is a fragmentation from the excavation activities | Absence of threat |
| Parameter 2.3. Dominant species | Depends from the habitat type | <i>Bothriochloa ischaemum</i> and <i>Stipa capillata</i> are dominants in 70–80% of the polygons | The dominant species are annual grasses | The dominants in the polygons are <i>Satureja</i> spp., <i>Stipa</i> spp., <i>Achillea clypeolata</i> , <i>Artemisia alba</i> , <i>Koeleria</i> spp., <i>Inula aschersoniana</i> | The species <i>Juni-perus oxycedrus</i> dominates in 50% of the polygons. |
| Parameter 2.4. Typical floristic combination | Depends from the habitat type | The combination is not completely typical in 80% of the polygons | The floristic combination is a typical in more than 90% of total area | The floristic combination is a typical in more than 90% of total area | Typical combination |
| Parameter 2.5. Total coverage | Depends from the habitat type | Total coverage is between 90 and 95% | More than 60% in the polygons as a result from the ruderalization | Total coverage is between 40 and 70% | The total coverage is about 70% |
| Parameter 2.6. Ruderalization | Ruderals are common and can form communities | There is a ruderalization in 80% from the polygons. The ruderal species are 5–10% from the species composition | The ruderal species cover more than 10% from the polygons | No this parameter | The ruderalization is not significant |
| Parameter 2.7. Invasive species | Invasive species cover more than 10% of the polygons | The invasive species are below 1%. | The invasive species cover less than 1% of the polygons | The invasive species cover less than 1% of the polygons | The invasive species cover less than 1% of the polygons |
| Parameter 2.8. Invasion of the shrubs and trees | Shrubs and trees cover not more than 10% of the polygons | Absence of threat | Absence of threat | Absence of threat | No this parameter |
| Comprehensive evaluation Criteria 2 | | Unfavourable – inadequate | Unfavourable – inadequate | Unfavourable – inadequate | Favorable |
| Parameter 3.1. Grassing activities | Yes/not overgrazing in the polygons | Absence of threat | There is an overgrazing in the polygons | Absence of threat | Absence of threat |

Table 1. Continued

| Habitats | | 6210 | 6220 | 62A0 | 5210 |
|--|--|---------------------------|---------------------------|---------------------------|-------------------|
| Parameter 3.2. The using of the fertilize in polygons or in the neighboring polygons | Yes/ no fertilizers | Absence of threat | Absence of threat | Absence of threat | Absence of threat |
| Parameter 3.3. Fires | Fires destroy more then 1% of the habitat area | No this parameter | No this parameter | No this parameter | Absence of threat |
| Parameter 3.4. Anthropogenic changes in water regime | Yes/No anthropogenic changes in water regime | No this parameter | No this parameter | No this parameter | No this parameter |
| Parameter 3.14. Existing of mowing | Positive impact of the mowing | No this parameter | No this parameter | No this parameter | No this parameter |
| Comprehensive evaluation criteria 3 | | Favorable | Unfavourable – inadequate | Favorable | Favorable |
| Overall assessment of the three criteria of FCS | | Unfavourable – inadequate | Unfavourable – inadequate | Unfavourable – inadequate | Favourable |

talized and processed in ArcGIS 10.1 as a basis for the used field research model and field notes. A layer containing all tested polygons and the final original map of grassland and shrub habitats of Natura 2000 site were done, thus allowing further work with them for conservation or management needs. “Guidance for assessing of the favourable conservation status of species and habitats in Natura 2000 in Bulgaria” (ZINGSTRA *et al.* 2009) was used for assessing of the favourable conservation status.

Results and Discussion

During the study and the mapping of the site, we recorded four habitats: 6210, 62A0, 6220 and 6210 (Fig. 1), which are subject of protection and are relevant for the populations of wild birds. The generalized table of their conservation status is also presented (Table 1).

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)

This habitat is represented by some closed communities located mostly in the shallow valleys scattered throughout the area and close to the base of the hills, where the soil collapses from the slopes due to erosion. Some of these areas were used in the more distant past as arable lands or were actively grazed by numerous domestic animals. These practices are almost abandoned now. As a result, they are relatively highly ruderalized and they also have poor species composition of the communities. The most widespread grasses are these dominated by *Bothriochloa ischaemum*, *Stipa capillata* and rarely *Chrysopogon gryllus*. Common species are also *Euphorbia nicaensis*, *Eryngium campestre*, *Coronilla varia*, *Teucrium polium*, *Allium rotundum*, *Sanguisorba minor*, *Scabiosa argentea* and *Crupina vulgaris*.

Conservation status: “Unfavourable inadequate”. The reasons are their poor and not typical species composition and the ruderalisation of 80% of the communities.

Identified threats to the habitat in the study area:

1. Some areas were farmlands in the past and there is a possibility for them to be ploughed again;
2. Plans for opening of new quarries in the site;
3. Ruderalization due to the active grazing in the past and the abandonment of the pastures in the present;

4. Reduction to the forage value due to the dominance of the some ruderals and *Stipa* spp.

Conservation activities proposals to the authorized institutions (Ministry of Environment and Waters – MoEW, Regional Inspectorates of Environment and Waters – RIEWs, Agricultural services) based on the distribution map and expected threats-Guidelines for future conservation activities based on the identified threats):

1. Non-allowance of activities leading to the reduction of the areas of the habitat, i.e. plowing, mining and others;

2. Stimulation of the mowing over several years, in order to eliminate the ruderal species;

3. Grazing by small sheep herds and adopting some plans to alternate the grazed areas to lead to maintaining of the habitat in the favourable parameters of pastures with low level of usage.

6220* Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*

This habitat is distributed mainly in the south-east part of the area near the villages of Novo Selo and Kurtovo. There are also smaller areas in other places in the area, which are not mapped because they are lesser than the minimum area (400 m²). The communities occupy the base of the hills on the condition of the actively grazing herds of domestic animals. Grazing eliminates the competition by perennial grasses and favours the development of the Mediterranean terrophytes including *Brachypodium distachyon*. Species of this ecological group identified in the studied communities were *Filago vulgaris*, *Velezia rigida*, *Sideritis montana*, *Medicago minima* and *Hippocrepis ciliata*. Some prickly ruderal species such as *Carthamus lanatus* and others also penetrate in the floristic composition as a result of the overgrazing.

Conservation status: “Unfavourable inadequate”. The main reason is the ruderalization because of the overgrazing and nitrification of the areas.

Identified threats to the habitat in the study area:

1. Plans for opening new quarries in the site.
2. Ruderalization as a result of intense grazing.
3. Reduction of the forage value due to the dominance of ruderals, spiny and non-edible by the livestock plant species.

Guidelines for the future conservation activities based on the identified threats

1. Using the map of the grassland and shrub habitats as a basis for the authorizing control institutions (MoEW; RIEWs, Agricultural services) to not

allow the activities leading to the reduction of the areas of the habitat, i.e. plowing, mining and others.

2. Reduction of the intensity of grazing by limiting the stay of the domestic animals in areas covered by this habitat.

62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*).

This habitat is represented by the most widespread grasslands in the site. It is very rich in different plant and animal species including a lot of rare, endemic and protected taxa. It is also very important habitat for birds. These communities occupy the largest territories on the hills (1652.4 ha). These are bare and eroded slopes and ridge parts of the hills. The habitat is represented of open petrophytic steppes, with communities dominated by Mediterranean and some Pontic species. The most frequent grasses are *Festuca valesiaca*, *Agropyron cristatum*, *Bothriochloa ischaemum* and *Koeleria* spp. The most widespread other perennial species are *Satureja coerulea*, *Inula aschersoniana*, *Achillea clypeolata*, *Achillea ageratifolia*, *Teucrium polium*, *Asphodeline lutea*, *Euphorbia myrsinites*, *Convolvulus cantabrica* and *Paronychia kapela*. Annual species with Mediterranean origin are also widespread: *Psilurus incurvus*, *Medicago minima*, *Hippocrepis ciliata*, *Trigonella monspeliaca*, *Euphorbia graeca*, *Crucianella graeca* and *Linaria simplex*. The main part of the important species (rare, protected, endemics) on Besaparski Ridove SPA are found in this habitat. Species of conservation significance are *Centaurea mannaegettae*, *Alkanna sibirnyi*, *Ruta graveolens*, *Turgeniopsis foeniculacea*, *Lathyrus saxatilis*, *Astragalus sesameus* and *Onosma rhodopea*.

Conservation status: “Unfavourable inadequate”. The habitat in the area will be in a favourable conservation status assuming that there will not be opening new quarries or expansion of the existing ones. Because of the many investment plans in this direction, we must assume that it is in “Unfavourable inadequate” and can go to “Unfavourable bad” by some criteria such as size, borderline and fragmentation without some adequate measures for prevention of the threats.

Identified threats to the habitat in the study area.

1. Plans for opening new quarries in the site.

Guidelines for future conservation activities based on identified threats

1. Using the map of the grassland and shrub habitats as a basis for the authorizing control institutions (MoEW, RIEWs, and Agricultural services) to

not allow the activities leading to the reduction of the areas of the habitat, mainly extractive activities.

2. Expansion of the existing and designation of new protected areas to cover at least 50% of the territory covered by the habitat.

3. Regulation of the grazing to avoid a negative response.

5210 Arborescent matorral with *Juniperus* sp.

This habitat is not subject of preservation of Natura 2000 site Besaparski Ridove, although it falls within its borders. Although *Juniperus oxycedrus* occurs in many places in the area as single bushes on the hills, more compact communities are located on the southern slopes of Kapitan-Dimitrievski ridge. Juniper communities form a complex with 62A0 and species composition of the herbaceous species is very similar.

Conservation status: “Favourable”.

Identified threats to the habitat in the study area:

1. Opening of new quarries and expanding of the existing located nearby.

2. Burning of shrub communities.

Guidelines for future conservation activities based on identified threats

1. Using the map of the grassland and shrub habitats as a basis for the authorizing control institutions (MoEW, RIEWs, and Agricultural services) to

not allow the activities leading to the reduction of the areas of the habitat – mainly extractive activities.

2. Include the habitat 5210 in the object and purposes of preservation of SCI Besaparski Vazvishenia.

3. Tighter control over the burning of the grassland and scrub and conducting an information campaign among the local people about the impact of these burns.

Conclusions

This study highlights the importance of Besaparski Ridove SPA for the nature conservation in Bulgaria, especially with its richness of petrophytic steppes. This SPA is essential with the conservation of the East-Mediterranean petrophytic species (62A0) because including many species with Mediterranean origin or endemics. They are an “oasis” for the flora and fauna in almost all processed and plowed Thracian Valley. Their protection is essential to the conservation of the biodiversity not only in Bulgaria, but in the Balkans and in Europe.

Acknowledgements; The study was completed within the framework of the Project “Conservation of globally important biodiversity in high nature value semi-natural grasslands through support for traditional local economy”, GEFSEC Project No. 43595, implemented by the Bulgarian Society for Protection of Birds and also to the anonymous reviewers for their useful comments.

References

- ANGELOVA, K., K. METODIEV and G. POPGEORGIEV 2008. The natural wealth of Bessaparski Hills. Sofia, (Bulgarian Biodiversity Foundation), 49 p. (In Bulgarian).
- DIMITROV M., D. PETROVA 2014. Forest habitats in Besaparski Ridove Special Protection Area (Natura 2000), southern Bulgaria: characteristics, status assessment and management recommendations. – *Acta zoologica bulgarica*, **Suppl. 5**: 129-136.
- STANEV S. 1975. Floristic materials with critical notes from the Besaparski Hills. 2. – *Fitologiya*, **1**: 82-87. (In Bulgarian, English summary).
- STANEV S. 1976. Analysis of the flora of the Besaparski Hills. – *Proceedings of the Museums in Southern Bulgaria*, Plovdiv, **2**: 21-64. (In Bulgarian).
- STANEV S. 1977a. Geobotanical characteristics of some phytocoenoses specific of the Besaparski Hills. 1. – *Fitologiya*, **6**: 16-31. (In Bulgarian, English summary).
- STANEV S. 1977b. Geobotanical characteristics of some phytocoenoses specific of the Besaparski Hills. 2. – *Fitologiya*, **7**: 25-50. (In Bulgarian, English summary).
- STANEV S. 1979. The herbaceous vegetation of the Besaparski Hills. 1. – *Proceedings of the Museums in Southern Bulgaria*, Plovdiv, **5**: 9-31. (In Bulgarian).
- STANEV S. 1980. The herbaceous vegetation of the Besaparski Hills. 2. – *Proceedings of the Museums in Southern Bulgaria*, Plovdiv, **6**: 19-51. (In Bulgarian).
- ZINGSTRA H., A. KOVACHEV, K. KITNAES, R. TZONEV, D. DIMOVA and P. TZVETKOV (eds.) 2009. Guidelines for assessing Favourable Conservation Status of Natura 2000 species and habitat types in Bulgaria. Sofia, (Bulgarian Biodiversity Foundation), 864 p.
- VELCHEV V., I. PENEV, I. BONDEV 1969. Development and recent problems of geobotany in Bulgaria. – In: YORDANOV, D.(ed.), Proc. Second Natl. Conf. Bot., Sofia. Sofia, (Bulg. Acad. Sci. Press), pp. 149-157. (In Bulgarian).