STANA PLATEAU – A POTENTIAL NEW PROTECTED AREA OF THE NATURA 2000 ECOLOGICAL NETWORK IN BULGARIA

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Abstract

A study of the natural habitats and target plant species on the Stana Plateau was conducted in order to determine its potential for designation as a protected area under the Natura 2000 Ecological Network in Bulgaria. 10 types of natural habitats were identified, of which 5 are priority for conservation, and one plant species, the preservation of which requires the designation of special protected areas, giving grounds for the Stana Plateau to be a suitable site for inclusion in the Natura 2000 Ecological Network in Bulgaria. As a result of the fieldwork and mapping, the distribution and area of each of the natural habitats were determined, as well as the distribution and abundance of the identified target plant species from Annex II of Directive 92/43/EEC. The conservation status of the natural habitats and the target plant species was determined. They are the basis for future measures in preparing an order for designation and a management plan for the protected area. The proposed boundaries of the protected area are the result of a balanced approach to nature conservation and the development of economic activity in the Stana Plateau region.

Key words**: **special protected area, natural habitats, target plant species, Directive 92/43/EEC

INTRODUCTION

The Stana Plateau is located in Northeastern Bulgaria (Fig. 1). Its name comes from the village of Stan (Novi Pazar municipality), located on its southern slope. The plateau rises in the central part of the Eastern Danubian Plain. To the west, its slopes reach the Kriva River valley, which separates it from the Voyvodsko Plateau and the Pliskovsko Field. Its southern border coincides with that of the Provadiysko Plateau, and the south-eastern slopes descend to the Zlatina River valley (a left tributary of the Provadiyska River). To the east, it borders the Dobrudzha Plateau, while to the north it smoothly passes into the Ludogorsko Plateau (Michev et al., 1980).

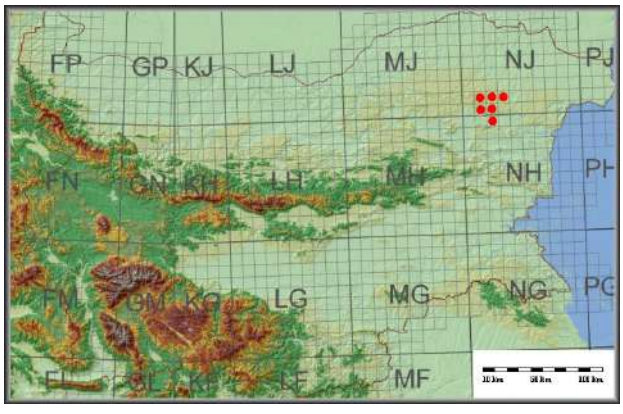

Figure 1. Geographical location of the Stana Plateau

The total area of the Stana Plateau is 165.5 km². Its highest point reaches 440.9 m above sea level. It ranks among the higher plateaus located in the Eastern Danubian Plain.

The relief is plateau-like, with the steepest being the western slopes towards the Kriva River valley, the southern ones towards the Provadiyska River, and the southeastern ones towards the Zlatina River valley. The northeastern and northern parts smoothly transition to the neighbouring Dobrudzha and Ludogorsko plateaus (Michev et al., 1980). A characteristic feature is the absence of rock crowns and exposed rock formations.

According to data from the Geographic Information System for the geological composition and structure of rocks in Bulgaria, the following rock types are represented in the Stana Plateau region: marls, limestones, clayey limestones, clayey marls, loess, sandy loess and clayey loess. Clayey limestones and marls are predominant, which make up most of the territory.

The Stana Plateau is located in the Temperate Continental climate zone. The climate is characterized by hot summers and cold winters. A weakly stable snow cover is typical for the region. The average January temperature is about -1.1°C, while in the summer, due to the influence of tropical air masses, the average July temperature reaches 22.0°C (Kjuchukova, 1983). Precipitation is maximum in April–October and minimum in February–March. The annual amount of precipitation is in the range of 550–650 mm (Kjuchukova et al., 1986).

The main watershed between the rivers flowing into the Danube and those flowing into the Black Sea runs along the ridge of the plateau. The Zlatina River and the Karamandere River originate from the plateau. Both rivers are fed by rain and snow, with a maximum flow in February–March and a minimum in August–September. Several small dams have been built in the northern part of the plateau, the largest of which is the Dulapdere Dam, east of the village of Preselka (Michev et al., 1980, Google Maps).

According to GIS data on the soil cover of Bulgaria, various soil types and subtypes are represented on the plateau: rendzins (humus-carbonate), carbonate chernozems (sandy-clay), leached chernozems (heavy sandy-clay), leached chernozems (erod-ed), podzolized (leached) chernozems, dark gray forest soils (heavy sandy-clay), gray forest (medium and heavy sandy-clay), as well as alluvial and alluvial-meadow soils (sandy and sandy-clay). Leached chernozems with a heavy sandy-clay texture occupy the largest area - approximately half of the territory. Gray forest, alluvial and alluvial-meadow soils have the most limited distribution.

From a floristic point of view, the Stana plateau is located in the floristic region of Northeastern Bulgaria. Until now, the flora of the plateau has not been studied. The vegetation includes nine forest communities, two shrub formations, one grass community and three types of agricultural areas that arose on the site of former forest territories (Bondev, 1991).

MATERIALS AND METHODS

The present study was conducted using the route method in 2024 and 2025. The natural habitats of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Directive 92/43/EEC, Habitats Directive) are defined according to Kavrakova et al. (2009) and Biserkov et al. (2015). The target plant species from Directive 92/43/EEC were determined according to Peev et al. (2015). In determining the species affiliation of the plants identified during the fieldwork, the Key to the native and foreign vascular plants in Bulgaria

was used (Stoyanov et al., 2021; Stoyanov et al., 2022).

The mapping of the natural habitat types and the target species from Annex II of Directive 92/43/EEC was carried out according to the relevant Mapping Methodology (Annex 5 to the general report on a natural habitat or target species), prepared under Project DIR-59318-1-2 Mapping and determination of the conservation status of natural habitats and species – Phase I (2012). For this purpose, a Garmin Oregon 700 GPS was used during the fieldwork.

After the fieldwork, the delineation of the territories occupied by the habitats, the boundaries of the potential protected area and the calculation of their area were carried out using specialized software QGIS 3.32.0 Lima. The distribution maps, areas and participation of tree species in the first floor of the forest habitat types are based on the digital data for the forest management projects of the Novi Pazar State Forest Management Agency (2022-2031), the Provadia State Forest Management Agency (2024-2033) and the Palamara State Forest Management Agency (2022-2031), published on the website of the Executive Forest Agency. Information from the website "GIS map of old-growth forests in Bulgaria" of WWF was also used.

The conservation status of natural habitats and target species from Annex II of Directive 92/43/EEC has been determined according to the relevant Methodology for determining the conservation status of a natural habitat or target species, prepared under Project DIR-59318-1-2 Mapping and determining the conservation status of natural habitats and species – Phase I (2012).

RESULTS AND DISCUSSIONS

As a result of the study conducted on the Stana plateau, we identified 10 types of natural habitats and one plant species - 6927 *Himantoglossum jankae* from the Orchidaceae family, the conservation of which requires the declaration of special protected areas, according to Directive 92/43/EEC. Of the natural habitats, 5 are priority for conservation (marked with a star). Their distribution is mainly in the southern, western and eastern parts of the plateau, with some being associated with water bodies (rivers and dams), and others - with forest and open dry habitats. This diversity justifies the high conservation value of the area.

1. Distribution and conservation status of natural habitat types

Habitat 40C0* Ponto-Sarmatic deciduous thickets (Fig. 2) has the most limited distribution and area of all habitats on the Stana Plateau (Fig. 3). It is included in the critically endangered category in the Red Book of the Republic of Bulgaria (Biserkov et al., 2015).

Figure 2. Habitat 40C0* Ponto-Sarmatic deciduous thickets

Although its distribution in the country is considered to be studied, there is a lack of data in the literature on its distribution in this location. The habitat occupies an area of 0.14 ha. It is without fragmentation, with a typical dominant species *Caragana*

frutex, good regeneration and lack of invasive and ruderal species.

Figure 3. Distribution map of habitat 40C0*

The total projected coverage of the phytocenoses is less than 60%, which is below the threshold for favourable habitat status. This is the only parameter with a lower score. According to the rules for assessing the conservation status, this is a reason the overall status of the habitat is unfavourable-inadequate.

Habitat 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) (Fig. 4) is widespread (Fig. 5) and covers an area of 250.67 ha. It has a good structure, no fragmentation, dominant typical grass species and high projective cover, therefore under Criterion 1. Area within the zone boundaries and Criterion 2. Structure and functions it is in favourable condition.

Figure 4. Habitat 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)

Figure 5. Distribution map of habitat 6210

The presence of serious future threats, especially from the impact of fertilizers and pesticides leads to an assessment under Criterion 3. Future prospects (threats and impacts) and an overall assessment of unfavourable-bad condition.

Habitat 6240* Sub-pannonic steppic grasslands (Fig. 6) is distributed in the eastern and southern parts of the plateau (Fig. 7) on an area of 45.03 ha. It is also characterized by favorable parameters according to the first two criteria, but is strongly influenced by external pollutants, which also leads to an unfavourable-bad overall assessment.

Figure 6. Habitat 6240* Sub-pannonic steppic grasslands

Figure 7. Distribution map of habitat 6240*

Habitat 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (Fig. 8) is located along the banks of rivers and dams on the plateau (Fig. 9) on an area of 2.83 ha. It shows stability and a lack of significant threats, and is in a favourable state by all criteria.

Figure 8. Habitat 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

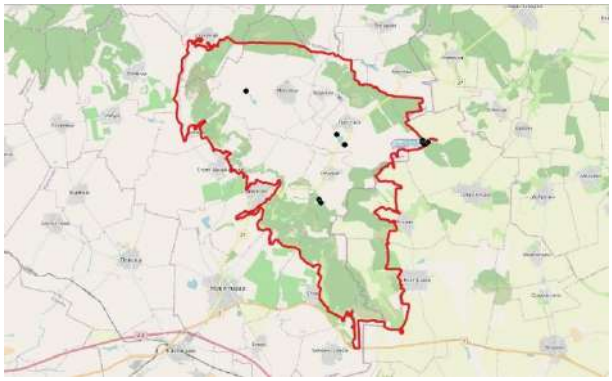

Figure 9. Distribution map of habitat 6430

Habitat 9150 Medio-European limestone beech forests of the *Cephalanthero-Fagion* (Fig. 10) has a very limited distribution in the western part of the plateau (Fig. 11). It has the smallest area among forest habitats – only 5.09 ha. It has a good condition in terms of area, structure and age of the tree layer, but is in an unfavourable-bad condition in terms of the presence of forests in the old-age phase, which leads to the same overall assessment.

Figure 10. Habitat 9150 Medio-European limestone beech forests of the *Cephalanthero-Fagion*

Figure 11. Distribution map of habitat 9150

Habitat 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (Fig. 12) is located along the banks of rivers and dams on the plateau (Fig. 13) on an area of 41.18 ha. It is in unfavourable-bad condition, due to the lack of old forests and dead wood. The ground cover is favourable, but the future prospects are

Figure 12. Habitat 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

unfavourable due to the presence of poor grazing, summer drying and cleaning of riverbeds.

Figure 13. Distribution map of habitat 91E0*

Habitat 91G0* Pannonic woods with *Quercus petraea* and *Carpinus betulus* (Fig. 14) is distributed in the northern and northwestern parts and in the southern half of the plateau (Fig. 15) on an area of 344.73 ha. It is in unfavourable-bad condition because there is a small area of forests in the old age phase and low age of the trees. The amount of dead wood is insufficient, and the ground cover is in good condition. Future prospects are unfavourable due to weak control of logging and poaching and the presence of an invasive species.

Figure 14. Habitat 91G0* Pannonic woods with *Quercus petraea* and *Carpinus betulus*

Figure 15. Distribution map of habitat 91G0*

Habitat 91H0* Pannonian woods with *Quercus pubescens* (Fig. 16) is distributed in the southwestern and western parts of the plateau (Fig. 17) on an area of 166.57 ha. It has a favourable condition according to a number of parameters such as: area, completeness and average age of the first tree layer, ground cover. Future prospects are favourable according to 9 parameters, but their overall assessment is unfavou-rable-bad condition due to the presence of successional processes. The area of old forests is insufficient, and the amount of dead wood and old trees is below the required level. The overall assessment is unfavourable-bad condition

Figure 16. Habitat 91H0* Pannonian woods with *Quercus pubescens*

Figure 17. Distribution map of habitat 91H0*

Habitat 91M0 Pannonian-Balkanic turkey oak-sessile oak forests (Fig. 18) is the most widespread habitat with an area of 1704.86 ha (Fig. 19). It has a favourable condition in terms of area and species composition, but the average age of the trees is below the required threshold, the area of old forests is insufficient, and the amount of dead wood and old trees is below the required level. Threats such as fires, poaching, construction and grazing have not been identified, but the overall condition is unfavourable-bad.

Figure 18. Habitat 91M0 Pannonian-Balkanic turkey oak-sessile oak forests

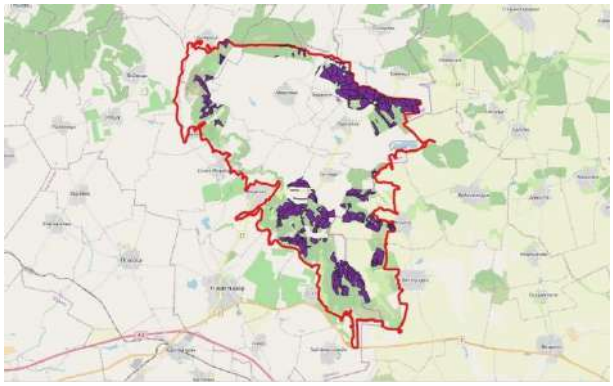

Figure 19. Distribution map of habitat 91M0

Habitat 91Z0 Moesian Silver lime woods (Fig. 20) has a very limited distribution in the southern half of the plateau (Fig. 21) and occupies an area of 25.60 ha. It has a favourable condition in terms of area and species composition, but the average age of the trees is below the required threshold, there are no forests in the old age phase, and the amount of dead wood and old trees is insufficient.

Figure 20. Habitat 91Z0 Moesian Silver lime woods

Figure 21. Distribution map of habitat 91Z0

Part of the habitat borders on crops with exotic species, and no other threats have

been registered, but the overall condition is unfavourable-bad.

2. Distribution and conservation status of the plant species

6927 *Himantoglossum jankae* (with new name *H. calcaratum*) (Fig. 22) is distributed mainly on the periphery of the plateau (Fig. 23). The conservation status is favourable. 103 locations have been identified, forming 37 subpopulations with a total of 671 individuals. The number of individuals ranges from 1 to 83 per location, and the area of the locations varies from 0.5 m^2 to 50 m^2. The density of individuals ranges from 0.002 to 3.13 individuals per sq. m, and the ratio of generative to vegetative individuals is low but stable. The total area of the habitats is 6.1080 ha, with a coverage of woody and shrub vegetation between 30 and 60% and at least 5% open habitats in the forests. No threats such as herbicide use, fires, development, grazing or mowing have been identified, and the character of the grasslands is preserved, leading to an overall favourable assessment of the species.

Figure 22. 6927 *Himantoglossum jankae*

Figure 23. Distribution map of 6927 *Himantoglossum jankae*

3. Boundaries of the protected area

When defining the boundaries of the proposed protected area (Fig. 24), the following principles were used:

1. Inclusion of natural habitats and habitats of the target species from Annex II of Directive 92/43/EEC, established on the territory of the Stana Plateau.
2. Exclusion of the territory of the settlements located on the periphery of the Stana Plateau.
3. Exclusion of arable land located on the periphery of the Stana Plateau.

As a result, the proposal for the boundaries of the “Stana Plateau” protected area is as follows:

1. To the north: It starts south of the village of Tsarkvitsa, passes along the valley of the Tulumdere River, before the Tranitsa Dam it turns south and follows

Figure 24. Boundaries of the Stana Plateau Protected Area (map base is from Google Maps)

the outlines of the forest massif south of the village of Tranitsa.

2. To the east: It passes east and south of the Preselka dam, follows the boundaries of the forest massif east of the village of Secishte and west of the village of Yagnilo, including the mosaic of grassland and arable land northeast of the village of Yagnilo, follows the outline of the slopes of the plateau west and southwest of the village of Belogradets, continues along a dirt road that leads to the mound located south of the village of Belogradets.

3. To the south: It passes along the dirt road west of the mound, follows the boundaries of the slopes of the plateau with arable land, turns south and skirts the hill northwest of the village of Zaychino oreshe, turns north excluding the areas with pine forest crops, follows the boundaries of the slopes of the plateau with arable land to the village of Stan.

4. To the west: It follows the boundaries of the slopes of the plateau with arable lands to the village of Pamukchii, passes east and north of the village of Pamukchii, follows the boundaries of the slopes of the plateau with arable lands to the village of Stoyan Mihaylovski, passes east and north of the village of Stoyan Mihaylovski, follows the boundaries of the slopes of the plateau with arable lands to the village of Zhilino, passes east, north and west of the village of Zhilino, continues along the Kriva Reka valley to the village of Tsarkvitsa.

The boundaries of the proposed protected area include the territory (partially or completely) of the following villages: Bedzhene, Belogradets, Voyvoda, Zhilino, Zaychino Oreshe, Mirovtsi, Pamukchii, Preselka, Tranitsa, Secishte, Stan, Stoyan Mihaylovski, Tsarkvitsa and Yagnilo.

CONCLUSIONS

The 10 identified types of natural habitats, of which 5 are priority for conservation, and one plant species, the preservation of which requires the declaration of special protected areas, provide grounds for the Stana Plateau to be a suitable site for inclusion in the Natura 2000 Ecological Network in Bulgaria.

The distribution and area of each of the natural habitats, as well as the distribution and abundance of the target plant species from Annex II of Directive 92/43/EEC as a result of the mapping carried out, are the basis for future measures in preparing an order for declaration and a management plan for the protected area.

The conservation status of the natural habitats and the target plant species from Annex II to Directive 92/43/EEC is unfavourable and requires measures to be taken for its improvement.

The proposed boundaries of the protected area are the result of a balanced approach to nature conservation and the development of economic activity in the Stana Plateau region.

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