On the issue of expanding the boundaries of the Natural Monument "Steppes near the Melovoe village" (Saratov Region, Russia)

S A Nevskiy and O N Davidenko

Department of Botany and Ecology, Saratov State University named after Nikolay G. Chernyshevsky, Saratov, Russia

E-mail: alenka71980@mail.ru

Abstract. Conservation of plants species is an integral part of conserving biodiversity in general. Establishing the natural monuments is an efficient method of conserving plant diversity. The aim of this study is to substantiate the need of expanding the boundaries of the natural monument "Steppes near the Melovoe village" in the Saratov Region, Russia. Standard methods of studying plant communities and coenopopulations were applied. The study of the plant communities needing protection was based on the criteria adopted by the Saratov Region Green Data Book. The description of unique communities and plant species needing in territorial protection is given. Currently, two plant communities unique for the region and several significant reference steppe communities bearing large populations of protected plant species (Iris pumila, Convolvulus lineatus, Stipa pennata, Adonis volgensis, Hedysarum grandiflorum) are still beyond the boundaries of this natural monument.

1. Introduction

Conservation of plants species is an integral part of conserving biodiversity in general. An efficient method of conserving phytodiversity is establishment of natural monuments. Nowadays, there are more than 90 protected areas in the Saratov Region, most of them are natural monuments [1]. The Natural Monument "Steppes near the Melovoe village" is located in the southeast of the Saratov region to the border with the Republic of Kazakhstan (figure 1).

Steppe areas near the Melovoe village occupy the western slopes of the Obshchii Syrt uplands [2]. Large populations of optional and obligate calciphytes, including the species protected at the regional and federal levels [3, 4] – Anthemis trotzkiana, Artemisia salsoloides, Linaria cretacea, Matthiola fragrans, Anabasis cretacea, Gypsophila volgensis – are the components of steppe vegetation on carbonate soils (figure 2). This natural monument is of utmost importance for the preservation of landscape and biodiversity.

The aim of this study is to substantiate the need of expanding the boundaries of the Natural Monument "Steppes near the Melovoe village" in the Saratov Region.

2. Materials and Methods

Standard methods of studying plant communities and coenopopulations were applied [5-7]. The study of the plant communities needing protection was based on the criteria adopted by Green Data Book.
including the Saratov Region Green Data Book [8, 9]. The dominant-determinant principle was followed, being implemented in naming the plant communities. Latin names of plant species are given according to S. Cherepanov's summary [10]. The protected plants’ categories and status are cited by the Saratov Region Red Data Book 2nd Edition: 2 (V) – vulnerable species, will be endangered soon, 3 (R) – rare species [2]. The study was carried out as part of inventory research for the need of protection of the steppe communities in the Saratov region [11].

**Figure 1.** Landscapes of the Natural Monument "Steppes near the Melovoe village"

**Figure 2.** Some rare plant species of the Saratov region: (a) – *Anabasis cretacea*; (b) - *Anthemis trotzkiana*; (c) - *Linaria cretacea*; (d) - *Artemisia salsoloides*. 
3. Results and Discussion
We propose to expand the boundaries of the Natural Monument "Steppes near the village Melovoe" and to include a section of chalk outcrops near the Melovaya River between the northwestern border of the monument and the village Melovoe into the zone under protection (figure 3). Two unique phytocoenoses with the dominance of Camphorosma lessingii and Limonium suffruticosum are noted for this area.

![Figure 3. Modern (1) and proposed (2) boundaries of the Natural Monument](image)

**Phytocoenosis no 1.**

1. *Rarity status category:* 1 (E) – (exceptional) includes the plant communities unique for the region and known by one or two locations only, conservation of which justifies establishment of specially protected nature areas.
2. *Syntaxonomic position:* Association *Limonium suffruticosum + Camphorosma lessingii*, formation *Limonium suffruticosum*.
3. *Floristics-phytocoenology significance* of the community is determined by the dominance of *Limonium suffruticosum* (3 (R)), listed in the second edition of the Saratov region Red Book. Until 2014, the territory of the Saratov Region lacked the data on plants communities with the dominance of this species and its coenotic role on the chalk soils. *Camphorosma lessingii* is the co-dominant in this community, it is a species that was totally absent in the lists of regional flora for recent years. It was recommended to include *Camphorosma lessingii* into the third edition of the Saratov Region Red Book [12]. Two protected species *Matthiola fragrans* (2 (V)) and *Crambe litwinowii* (3 (R)) were noted in the community in addition to the dominants listed above.
4. *Distribution.* The communities are known only from the surrounding area of the Melovoe village, the Ozinsky District.
5. *Habitat.* The plots of chalk outcrops.
6. *Phytocoenotic characteristic.* There are up to 10 species of plants in the communities. *Limonium suffruticosum* is the dominant species, *Camphorosma lessingii* is the co-dominant. The characteristic species are *Calamagrostis epigeos*, *Leymus ramosus*, *Artemisia lerchiana*, *Poa bulbosa*, and...
Gonioilonon graminifolium. The total projective coverage is about 40-60%. The stratification is not expressed. The coenopopulations of the dominant and co-dominant species are represented by multi-age individuals with a predominance of Camphorosma lessingii generative plants and Limonium suffruticosum virginal plants.

Phytocoenosis no 2.

1. Rarity status category: 1 (E) – (exceptional) includes the plant communities unique for the region and known by 1 or 2 locations only, conservation of which justifies establishment of specially protected nature areas.

2. Syntaxonomic position: Association Limonium, formation Limonium suffruticosum.

3. Floristics-phytocoenology significance of this community is determined by the dominance of Limonium suffruticosum, listed in the second edition of the Saratov Region Red Book. Three protected species – Matthiola fragrans (2 (V)), Convolvulus lineatus (3 (R)) and Camphorosma lessingii – were noted in the community in addition to the dominant one.

4. Distribution. The communities are known only from the surrounding area of the Melovoe village, the Ozinsky District.

5. Habitat. The plots and gentle slopes of chalk outcrops.

6. Phytocoenotic characteristic. There are up to 10 species of plants in the communities. Limonium suffruticosum is the dominant species. The characteristic species are Camphorosma lessingii, Artemisia lericiana, Poa bulbosa, and Gonioilonon graminifolium. The total projective coverage is about 50%. The stratification is not expressed. The coenopopulations of the dominant species are represented by multi-age individuals with a predominance of virgin or young generative plants.

Direct destruction as a result of grazing and the slope wash are the main destabilizing factors for these communities. These are natural regionally rare phytocoenoses with protected edificator plant species, so this is the major conservation motive.

The conservation within the boundaries of natural monuments of different rank, control of the state of communities, restriction of certain types of economic activity are the main recommended protection measures for such communities.

That is why it is necessary to expand the boundaries of the Natural Monument "Steppes near the Melovoe village" and to include the chalk outcrops with these unique phytocoenoses into the list of the regional protected areas. Currently, two plant communities unique for the region and several significant reference steppe communities bearing large populations of protected plant species (Iris pumila, Convolvulus lineatus, Stipa pennata, Adonis volgensis, Hedysarum grandiflorum) are still beyond the boundaries of this natural monument.

When expanding the boundaries, the Nature Monument "Steppes near the Melovoe village" will provide territorial protection to many reference steppe phytocoenoses, to the communities of the protected steppe and calcicolous plant species, to exceptionally rare plant communities known by 3-5 location within the region, and to the two unique communities, which are known only from the surrounding area of the Melovoe village, the Ozinsky District of the Saratov Region. The conservation potential of this natural monument should be recognized as one of the highest among all the natural monuments of the Saratov Region [2, 13, 14]. The future expanding of the boundaries of this natural monument located far from the regional center, in the southeastern part of the region, allows us to hope for a possibility of conserving its biodiversity in full.

References

[1] Chumachenko A and Shlyakhtin G 2017 Saratov Region environmental issues in Year of Enviroment and Year of Specially Protected Nature Areas. Izvestiya Saratovskogo universiteta. Novaya seriya. Seriya: Himiya. Biologiya. Ekologiya 17(3) 345-57

[2] Specially protected nature areas of Saratov Region 2008 (Saratov: Sarat. un-ta Publ)

[3] The Red Data Book of the Saratov Region 2006 (Saratov: Izd-vo Torgovo-promyshlennoj palaty
4th Conference on Actual problems of specially protected natural areas

IOP Conf. Series: Earth and Environmental Science 607 (2020) 012012 doi:10.1088/1755-1315/607/1/012012

Sarat obl)

[4] The Red Data Book of the Russian Federation (Plants and Fungi) 2008 (Moscow: T-vo Nauch. Izd. KMK)

[5] Smirnova O V 2004 Evaluating population’s condition by ontogenetic spectrum type Vostochnoevropejskie lesa: istorija v golocene i sovremennost’ vol 1 (M.: Nauka) p 479

[6] Zhukova L and Poljanskaja T 2013 On certain approaches to forecasting development outlook for plant cenopopulations Vestnik TvGU. Serija “Biologija i jekologija” 32(31) 160-71

[7] Harper J 1977 Population biology of plants (N.Y.: Acad. Press)

[8] Bulohov A, Semenishhenkov Ju, Panasenko N, Anishchenko L, Averinova E, Fedotov Ju, Harin A, Kuz’menko A and Shapurko A 2012 Green Data Book of the Bryansk Region (plant communities in need of protection) (Bryansk: Bryansk. Polyg. Association)

[9] Davidenko O, Nevskij S, Davidenko T, Beljachenko A, Grebenjuk S, Lysenko T, Serova L, Fomkin Ju, Hudjakova L and Sulejmanova G 2018 Green Data Book of the Saratov Region: plant communities in need of protection (Saratov: Amirit)

[10] Cherepanov S 1995 Vascular plants of Russia and neighboring states (within the former SOVIET Union) (St. Petersburg: Peace and Family)

[11] Davidenko O, Nevskii S and Davidenko T 2018 Informational and Technical Support of Needing Protection Saratov Region Plant Communities Inventory Izvestiya Saratovskogo universiteta. Novaya seriya. Seriya: Khimiya. Biologiya. Ekologiya 18(3) 361-65

[12] Arkhipova E et al. 2016 Species of flowering Plants that are recommended for inclusion in the third Edition of the Red Data Book of the Saratov Oblast’. Izvestiya Saratovskogo universiteta. Novaya seriya. Seriya: Khimiya. Biologiya. Ekologiya 16(3) 303-09.

[13] Shilova I, Panin A and Petrova N 2013 About Some Sites of the Left Bank of the Saratov Region Interesting in the Botanical Relation, Offered to Inclusion in the Regional Network of Especially Protected Natural Territories Byulleten’ Botanicheskogo sada Saratovskogo gosudarstvennogo universiteta 11 41-46.

[14] Shilova I, Panin A, Petrova N and Kharitonov A 2013 Some Volga Left Bank Riverside Areas Recommended for Integration into the Regional Network of Specially Protected Nature Areas Trudy Mordovskogo gosudarstvennogo prirodnogo zapovednika im. P.G. Smidovicha 11 282-86.