

Project Update: January 2019

Exploring of the Rare Plant Populations and Habitat Diversity

In June-September 2019 our team carefully investigated the territory of the National Nature Park Buzkyi Gard. Twelve expeditions totalling 75 days were organised with the participation of scientists, specialists of the National Nature Park and environmental activists. In total there were 16 participants: Dariia Shyriaieva, Hanna Kolomiiets, Denys Vynokurov, Nadiya Sychak, Anna Kuzemko, Lubov Borsukevych, Valeryi Darmostuk, Olha Bevkh, Olena Vakarenko, Vladislav Artamonov, Andryi Sydorak, Sergyi Legkyi, Svitlana Artamonova, Roman Yavorskyi, Vadym Varych and Vitalii Tyagunov.

According to the National Habitat Catalogue of Ukraine and the results of our field work during June-October 2019, 32 main habitat types are present at the territory of the park, among them there are 20 habitats protected by Resolution 4 of the Berne Convention.



Expedition field work, June-September 2019

Among the habitats, protected by Resolution 4 of the Berne Convention, habitat types **E1.2** *Perennial calcareous grassland and basic steppes*, **E1.11** *Euro-Siberian rock debris swards* and **H3.1** *Acid siliceous inland cliffs* are some of the most valuable in the Southern Bug river valley, because of their unique richness in endemic and rare species, such as *Dianthus hypanicus*, *Silene hypanica*, *Silene sytnikii*, *Moehringia hypanica*, *Tulipa hypanica*, and *Sedum borissovae*.

Areas of habitats **C2.27** *Mesotrophic vegetation of fast-flowing streams*, **C2.28** *Eutrophic vegetation of fast-flowing streams*, **C2.12** *Hard water springs*, **E3.4** *Moist or wet eutrophic and mesotrophic grassland*, **F9.1** *Riverine scrub*, **G1.11** *Salix woodland*, **G1.7** *Thermophilous deciduous woodland*, **G1.A1** *Quercus - Fraxinus - Carpinus betulus woodland on eutrophic and mesotrophic soils* and **G1.A4** *Ravine and slope woodland* are the southernmost in the Southern Bug river valley localities of such rare for the steppe zone habitats.

In general, around 900 vascular plant species were registered for the territory. Some species were found for the first time in National Nature Park Buzkyi Gard: *Aegonychon purpureocaeruleum*, *Festuca rubra*, *Carex secalina*, *Carex stenophylla* and *Adoxa moschatellina*. Mainly, the new species relate to the forest and meadow habitats, which had not been studied so carefully before our investigations. In addition, moss and lichen samples from different habitat types were collected for determination.

For 28 plant species which are protected by Red Book of Ukraine (2009), we have collected 890 mapping points with precise GPS-coordinates. These species are: *Dianthus hypanicus*, *Moehringia hypanica*, *Cerasus klokovii*, *Gymnospermium odessanum*, *Silene hypanica*, *Silene sytnikii*, *Pulsatilla pratensis*, *Tulipa hypanica*, *Adonis vernalis*, *Astragalus ponticus*, *Astragalus dasyanthus*., *Onosma graniticola*, *Delphinium sergii*, *Stipa disjuncta*, *S. capillata*, *S. tirsia*, *S. graniticola*, *S. pulcherrima*, *S. pennata*, *S. dasyphylla*, *S. ucrainica*, *S. asperella*, *Thalictrum foetidum*, *Fritillaria ruthenica*, *Ornithogalum boucheanum*, *Tulipa quercetorum*, *Stachys angustifolia* and *Crocus reticulatus*.



Dianthus hypanicus - endemic of siliceous rocky outcrops in Southern Bug river basin (left); *Moehringia hypanica* - narrow endemic species with three known populations in National Nature park Buzkyi Gard (right).



Gymnospermium odessanum - endemic of Pontic steppe region (left); petrophytic steppe vegetation with endemic plant species *Silene hypanica* in vicinity of Bohdanivka village (right).

Habitat mapping

Habitat mapping was carried out using open-source GIS software (NextGIS Mobile; QGIS 3.4.13-Madeira), field and satellite data (orthophoto maps from public cadastral map of Ukraine; Google Satellite). 670 mapping polygons for 25 habitat types with total area of 3200 ha were collected. Habitat mapping will be finished by our team in the next field season (April-June 2020).

Presentations of the project results

The first scientific and conservation results of the project were presented at the International Conference Advances in Botany and Ecology (Kharkiv, September 6-9, 2019) with presentations «Habitats of the National Nature Park «Buzkyi Gard», «Autochthonic and allochthonic fractions of woody-shrub flora of the National park Buzky Gard» and «Ecological and coenotic features of *Stipa graniticola* Klokov in the Southern Bug River valley». Also, three training sessions were organised for the specialists of the National Nature Park Buzky Gard from the departments of ecology education and nature protection (rangers). This training was dedicated to the rare species and habitat mapping using open-source GIS software (NextGIS Mobile; QGIS 3.4.13-Madeira).

We plan to arrange more presentations during the spring 2020, when educational and promotional materials will be printed.



Preparation of the educational and promotional materials

In November 2019 we started the preparation of the educational and promotional materials which were planned in the project. Text and photos for the booklet are ready for the design phase; text and photos for the book are also ready for the design phase. By the end of March 2020, we expect these materials to be published.

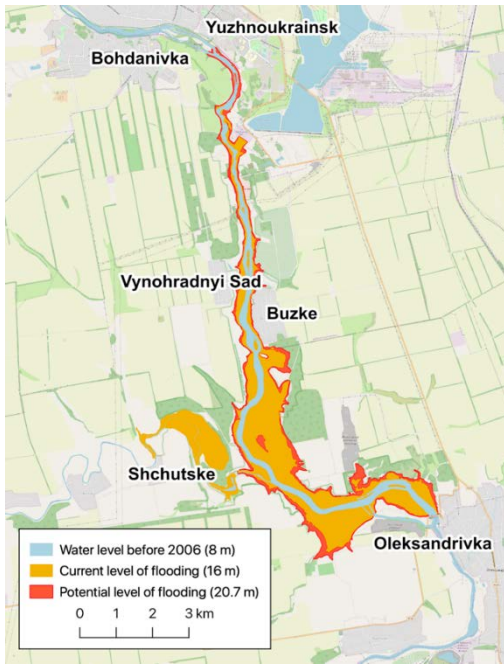
Threat Assessment for Habitats and Plant Species. Unique rocky grasslands under threat due to the hydropower and nuclear power plant development

The main conservation problems for the most valuable habitats of "Buzkyi Gard" nowadays are: 1) fragmentation as a result of historical agriculture and industry development, 2) a lack of management activities, mainly grazing and mowing, and the resulting transformation processes from grassland (steppe) to shrub, including invasive species, and 3) extinction of valuable habitats, including river rapids and granitic outcrops, due to flooding by Oleksandrivka water reservoir as a result of the expansion of south Ukraine electric power producing complex.

One of the most valuable natural boundaries of the national park, named "Gard", was partially flooded as a result of raising the Oleksandrivka reservoir level up to 14.7 m in 2006, and up to 16.0 m in 2010, with the natural level for the river about 5 m above sea level. In 2009, some valuable territories were not included in the National Nature Park because of the lobby of the nuclear power plant and hydropower complex. In the nearest future, the level of the Oleksandrivka water reservoir could be raised to 20.7 m.

The potential impact of projected flooding was studied by our working group. We investigated the areas, which could be directly flooded or potentially indirectly affected by microclimatic changes. The character of indirect affecting was also studied from the banks of down part of the Oleksandrivske water reservoir, which are influenced by flooded areas over the past almost 10 years. Information was prepared for the environmental impact assessment.

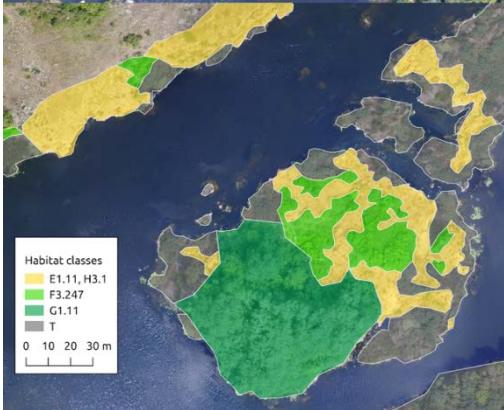
For such threatened species as *Moehringia hypanica* we studied all populations and their sizes, for other rare species a population count on model sites and transects were used (20 model sites and 23 transects were laid). Phytosociological relevés were collected for describing habitats which could be affected by flooding. Habitat mapping was carried out using open-source GIS software (NextGIS Mobile; QGIS 3.4.13-Madeira), field data (point and polygon layers), satellite base maps (orthophoto maps from Public cadastral map of Ukraine; Google Satellite) and detailed topographic maps (scale 1:10 000). In general, 280 mapping polygons for 14 habitat types with total area of 254 ha and 508 mapping points for 20 plant species with total count of 3989 plants were collected. The main habitat types (up to three for one polygon), coverage for each habitat types and average inclination were registered for each mapping polygon.



In general, natural and semi-natural landscapes with a total area of 254 ha would be flooded if the level of the Oleksandrivka water reservoir is raised, as planned, from 16.0 m to 20.7 m. Seventeen habitats protected by Resolution 4 of the Berne Convention and 12 plant species listed in the Red Data Book of Ukraine (2009), including two species listed in Resolution 6 of the Berne Convention, would be affected by direct flooding and indirect influence. Areas of habitats **E1.11 Euro-Siberian rock debris swards** and **H3.1 Acid siliceous inland cliffs**, which would be affected, are some of the most representative and important habitats of the rare endemic species *Dianthus hypanicus* and *Moehringia hypanica*. Areas of nine habitat types, including thermophilous and mesophilous deciduous woodlands are very important to be preserved because they are the southernmost in the Southern Bug river valley localities of such rare for the steppe zone habitats.



Left image: Natural boundary Gard, fragment of the drone orthophoto map (upper part) with habitat mapping (lower part). Habitat types: E1.11 Euro-Siberian rock debris swards, H3.1 Acid siliceous inland cliffs, F3.247 Ponto-Sarmatic deciduous thickets, G1.11 Salix woodland. Class T combines all areas, which were transformed by previous flooding (ruderal and semi-natural). Basemap: © Anton Biatov, aerial drone mapping.



Lower image: Part of detailed aerial drone photography mapping of the model site on granitic outcrops, in the zone of potential flooding. The yellow circles mark individual plants of *Dianthus hypanicus* – endemic of the territory of National Nature park Buzkyi Gard and surrounding areas of the Dnieper Upland. © M. Khytruk.

