

Flora of the Regional Landscape Park “Lysa Gora”: a preliminary analysis and management approaches

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Abstract: The Regional Landscape Park (RLP) “Lysa Gora” is located in the southeastern part of the city of Kyiv, at the border of the forest and forest-steppe physiographic and vegetation zones. During 100 years, “Lysa Gora” was a restricted-access military zone, which in fact saved its unique biodiversity. The native flora of the RLP “Lysa Gora” consists of at least 352 species of vascular plants belonging to 245 genera and 75 families. In the taxonomical structure the leading roles are played by the families Poaceae (34 species), Asteraceae (32), Fabaceae (26), Rosaceae (20) and Lamiaceae (20). The non-native flora consists of at least 77 species of vascular plants belonging to 63 genera and 29 families (ca. 20% of the total flora). A comprehensive analysis of the native and non-native flora is provided. The stable component of the flora consists of 54 species from 47 genera and 23 families. Epocophytes (47 species, 61%) greatly prevail. The percentage of archaeophytes (ca. 30%) is lower than that of kenophytes (ca. 70%). Leading roles are played by species native to North America (18, 23%) and the Mediterranean-Central Asian regions (12, 15.5%). Main routes of invasion of non-native species are railway lines coming close to “Lysa Gora” from two sides. Additional hotspots of non-native species are spontaneous garbage dumps. An efficient management system is needed for preventing and restricting further invasions in “Lysa Gora”.

Key words: native, non-native plants, flora, Lysa Gora, Kyiv, Ukraine

1. Introduction

Losses in biological diversity are increasingly attributed to the expanding human impact on natural ecosystems. Protected areas are internationally recognized as a major tool in conserving species and ecosystems. They also provide a range of goods and services essential to sustainable use of natural resources (Parks... 2008).

According to Ukrainian legislation (Law of Ukraine 1992), a regional landscape park (RLP) is a multifunctional protected area, created on the local or regional level, and aimed at conserving in natural condition the typical or unique natural complexes and objects, or at providing the necessary conditions for recreation needs. The Regional Landscape Park (RLP) “Lysa Gora” is located in the south-eastern part of Kyiv, at the border of the forest and forest-steppe physiographic and vegetation zones. According to Andrienko (1977), this territory belongs to the Obukhiv-Vasyl’kiv area of the forest-steppe zone of Ukraine. During 100 years (since 1872 until 1970), “Lysa Gora” was a restricted-access military

zone, which in fact saved its unique biodiversity. Since 1994, “Lysa Gora” is the Regional Landscape Park with the total area of 137.1 ha. Now the hill is a good model for studies of the influence of urbanization on the flora of semi-natural areas within a large city.

The main objectives of this research were: to compile the list of species of the RLP, to analyze the native and non-native flora on the basis of the list and to develop an efficient management approaches appropriate for the RLP, in order to minimize the anthropogenic pressure on natural flora.

2. Material and methods

Flora surveys were conducted during 2000-2008 through field observations with registration of all new species. At first, we investigated rare species of the flora, and, during recent years, more attention was devoted to non-native plants. Standard Ukrainian manuals and identification keys were used for species identification (e.g., Prokudin & Dobrochaeva 1987). Additionally, we

also used herbarium materials (KW) and consulted Prof. Sergei Mosyakin, and other experts in various taxonomic groups. For the flora analysis we used standard approaches. Non-native plants were analyzed according to the traditional categorization (Protopopova 1991). We used also some historical sources and earlier publications.

3. Results

According to our data, the native flora of "Lysa Gora" (taxa confirmed in 2000-2008), consists of at least 352 species of vascular plants belonging to 245 genera and 75 families. The leading families (by species richness) are Poaceae (34 species), Asteraceae (32), Fabaceae (26), Rosaceae (20), Lamiaceae (20), Caryophyllaceae (19), Brassicaceae (15), Ranunculaceae (11) (Parnikoza & Grechyshkina 2007).

The non-native flora of the RLP "Lysa Gora" consists of at least 77 species of vascular plants belonging to 63 genera and 29 families. In the taxonomic structure, the leading role is played by species of the families Asteraceae (13 species), Brassicaceae (12), Chenopodiaceae (9) and Poaceae (6). The stable component of the flora consists of 54 species from 47 genera and 23 families. Analysis of non-native plants by their degrees of naturalization has shown that epocophytes clearly prevail (47 species, 61%). According to the time of immigration, the percentage of archaeophytes (ca. 30%) is lower than that of kenophytes (ca. 70%). Leading roles are played by species native to North America (18 species, 23%) and the Mediterranean + Irano-Turanian region (12, 15.5%) (Parnikoza & Grechyshkina 2008). Many American alien plants are now very common components of man-made, semi-natural and natural

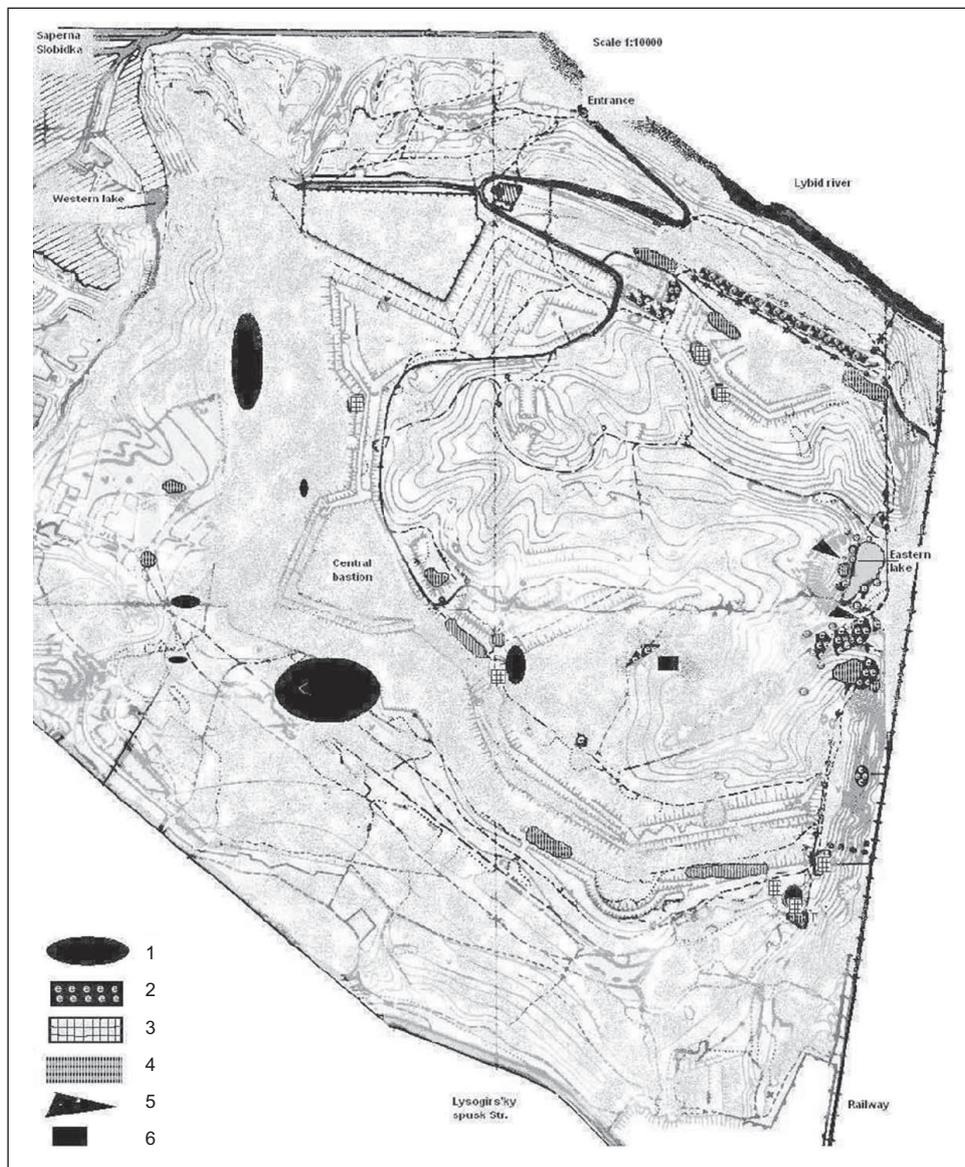


Fig. 1. The distribution and the abundance of rare species on „Lysa Gora”

Explanations: 1 – *Pulsatilla pratensis* subsp. *bohemica*, 2 – *Epipactis helleborine*, 3 – *Iris hungarica*, 4 – *Convallaria majalis*, 5 – *Actaea spicata*, 6 – *Neottia nidus-avis*

habitats. In many cases, they are also firmly incorporated into the local floras and plant communities (Protopopova *et al.* 2006). Among the most invasive American (South and North) plants registered on the hill are *Acer negundo* L., *Ambrosia artemisiifolia* L., *Galinsoga parviflora* Cav., *Lepidium densiflorum* Schrad. and *Asclepias syriaca* L. Main routes of invasion of the non-native plants are railways coming close to “Lysa Gora” from two sides. Additional hotspots of non-native species are spontaneous garbage dumps. According to Mosyakin (1996), the hotspots of plant invasions belong to the central zone of expansion of non-native plants in Kyiv.

The rare component of the flora is represented by species listed in the Red Data Book of Ukraine (Shelyag-Sosonko 1996): *Pulsatilla pratensis* (L.) Mill. subsp.

bohemica Skalicky (= *P. nigricans* Störck), *Stipa capillata* L., *Epipactis helleborine* (L.) Crantz and *Neottia nidus-avis* (L.) Rich. (Figs. 1 and 2); in the Kyiv Red List approved by the state decrees (Parnikoza *et al.* 2008): *Anemone sylvestris* L., *Iris hungarica* Waldst. et Kit., *Scorzonera purpurea* L., *Scilla bifolia* L., *Corydalis cava* (L.) Schweigg. et Koerte and *Convallaria majalis* L. (Figs. 1 and 2). Some species with no protected status, like *Dianthus membranaceus* Borb., *Actaea spicata* L. and *Gagea erubescens* (Besser) Schult. et Schult. fil., occur on the hill as well (Figs. 1 and 2). We were unable to confirm some species that were listed in the earlier publication (Chopik *et al.* 1986), among them are *Prunella grandiflora* (L.) Scholl, *Pulsatilla patens* (L.) Mill. and *Potentilla alba* L. Moreover, we did not observe any appropriate habitats for them on “Lysa Gora”,

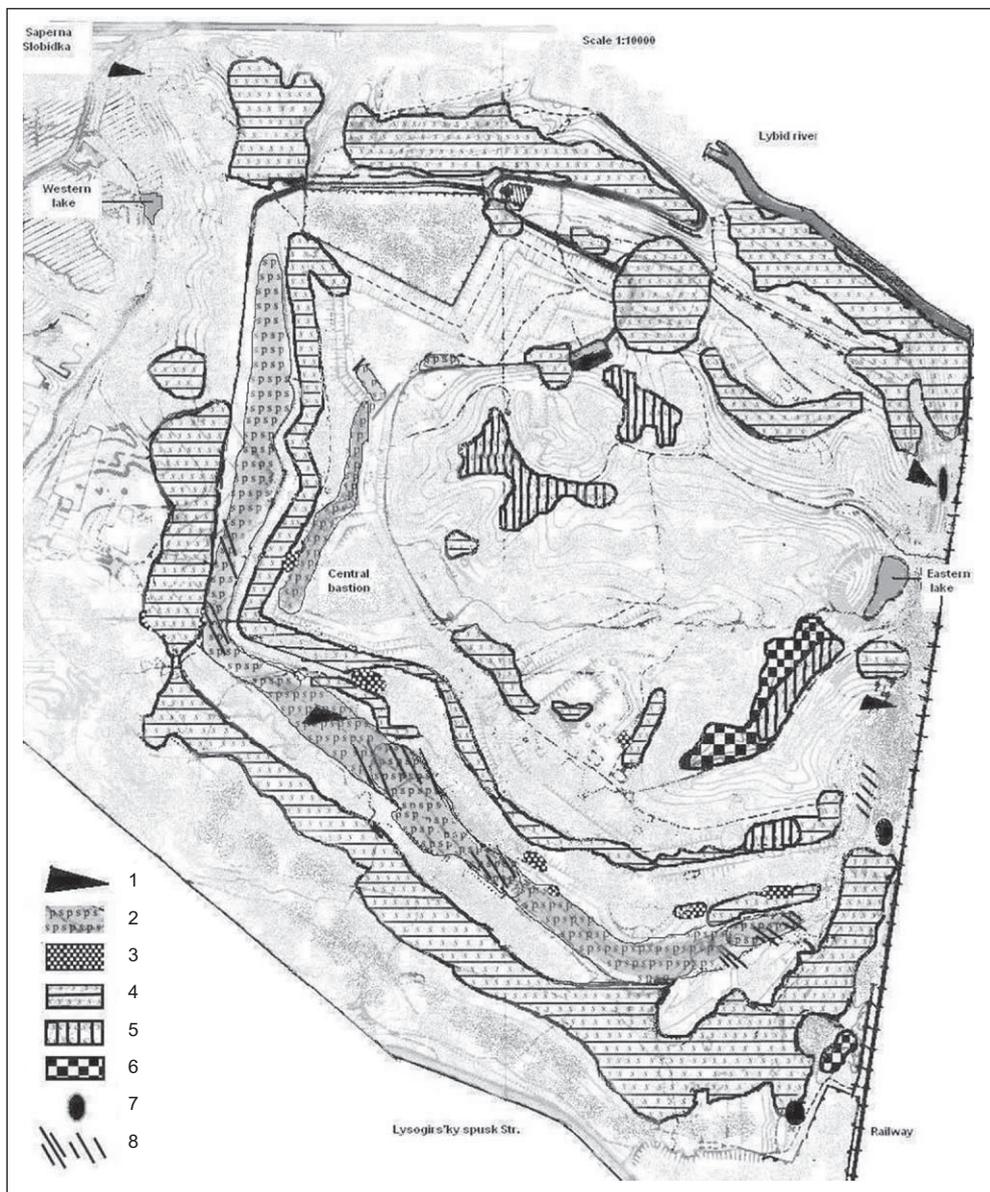


Fig. 2. The distribution and the abundance of rare species on „Lysa Gora”

Explanations: 1 – *Stipa capillata*, 2 – *Scorzonera purpurea*, 3 – *Anemone sylvestris*, 4 – *Scilla bifolia*, 5 – *Scilla bifolia* + *Corydalis cava*, 6 – *Corydalis cava*, 7 – *Gagea erubescens*, 8 – *Dianthus membranaceus*

and thus believe that they were reported erroneously. It is worth mentioning that we recently found *Isopyrum thalictroides* L. not far from the hill in the forest of Golosiiv and, because of that, we consider that this species could be also found in "Lysa Gora". Such species as *Epipactis atrorubens* (Hoffm. ex Bernh.) Schult. (Shelyag-Sosonko *et al.* 1984) and *Lilium martagon* L. were listed in the earlier publication of Chopik *et al.* (1986), but never confirmed later.

4. Discussion

Presence of indigenous species in the modern flora of the hill of the forest-steppe zone is the evidence of preservation of the native flora of the Dnieper (Prydniprovska) Heights. According to Elin & Meshcheriakov (1973), this meaning is characterized by the group of

species-edificators of forest complexes. We consider that among all rare plants only *Neottia nidus-avis*, *Scilla bifolia*, *Corydalis cava*, *Convallaria majalis* and *Actaea spicata* are conserved in insular habitats. Exactly these species are typical for oak – hornbeam forests of Golosiiv and Feofania – the fragments of continuous forests of ancient times of the Kyiv Plateau.

The origin of the meadow-steppe component of the flora is debatable. We consider that this component may have anthropic origin. In XIX century, the hill was used as a pasture (Golovanov 2002) and the part of the forest was cleared. That is why, the species of this complex may be younger in comparison with the forest ones. This statement could be true for some rare steppe plants, such as *Pulastilla pratensis* subsp. *bohemica* or s. l., *Stipa capillata*, *Scorzonera purpurea* and *Dianthus membranaceus*. Moreover, the first two species are sen-

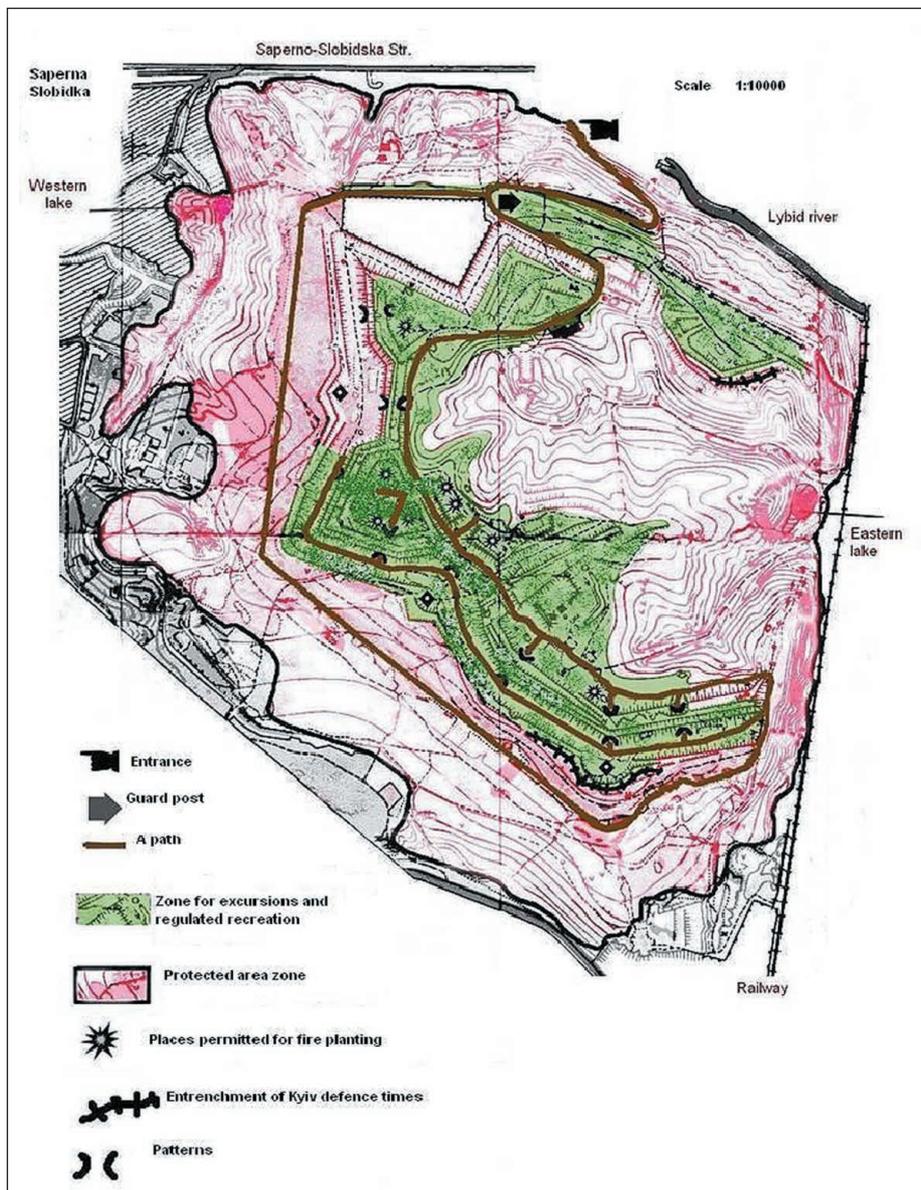


Fig. 3. Zoning of the territory of RLP „Lysa Gora”

sitive to grass burning (Parnikoza & Inozemtseva 2005; Parnikoza *et al.* 2007). The hill could have been used as a pasture until 1872, when it was taken from its previous owner, the Kyiv-Pecherck Lavra (monastery), and was given for the founding of Lysogirs'ky Fort (Golovanov 2002). Thereby, the remnants of the natural forest vegetation with rare plants described below could survived only in the "Lysa Gora" ravines. There was no cutting down of trees, which is confirmed by the presence of more than 200-year-old oaks, exactly in these parts of the hill. Maintenance of fortification required suppressing of forest vegetation, which promoted the spread of the meadow-steppe flora. Starting from the end of the 19th century, the fort had lost its defence functions and was used as closed military storages (Golovanov 2002). Natural flora resources probably increased in that time. Since 1970, military storages were closed and the territory became the Regional Landscape Park (Movchan 2001). Unfortunately, the RLP existed only on the paper (administration staff) and, because of that, unregulated visiting (i.e. car visitors) resulted in the degradation of the natural flora and vegetation. Such situation is favourable for dispersal of synanthropic plants from the large areas occupied by synanthropic vegetation near the bottom of the hill. Some of these species occur only in anthropically altered areas, so there are no big problems with their control and regulation. Some species, however, like *Ailanthus altissima* (Mill.) Swingle, are very aggressive and actively incorporate into steppe vegetation. It is interesting that

Epipactis helleborine spreads in similar way in secondary forests with the lowest competition among other forest species.

According to the Law of Ukraine (1992), it is possible to zone a protected area into (1) a protected zone and (2) zone for excursions and regulated recreation (Fig. 3). The main purpose of zoning is to maintain the current balance between the native and non-native flora and plant communities. We included in the protected zone all the areas with the remaining natural vegetation. In order to comprise the effectiveness of zoning, special rules of visitors' behavior were developed for the recreation zone. We should emphasize that strict observance of zoning is important for conservation of the "Lysa Gora" natural flora and of its integral modern area. The approaches developed for "Lysa Gora" can be used in other protected areas within large cities.

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