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Deliverable T2.1.3 - Recommendations for improving the conditions for biodiversity in Lūznava manor park

Vilnius, 2022

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2014–2020 m. Interreg V-A Latvijos ir Lietuvos bendradarbiavimo per sieną programa siekia prisidėti prie darnaus programos teritorijos vystymosi padėdama jai tapti patrauklia ir konkurencinga vieta gyventi, dirbti ir apsilankyti. Šį Projektą iš dalies finansuoja 2014–2020 m. Interreg V-A Latvijos ir Lietuvos bendradarbiavimo per sieną programa ir Lietuvos Respublika. Visas projekto biudžetas 1 030 848,12 Eur. Iš jų – bendrasis Europos regioninės plėtros fondo finansavimas 876 220,89 Eur.

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Introduction

Lūznava manor park is located in Rēzekne district and belongs to Rāzna National Park (Figure 1). The park has a status of protected cultural and historical monument of national significance. Based on the existence of ancient cemeteries, the territory of Lūznava has been inhabited for more than a thousand years. The park of Lūznava manor was established after the construction of manor in the 19th century. The park is designed as a landscape park (23.7 ha) with a 2.6 ha large system of seven ponds. Nowadays the park has a renovated ~ 1 km long tourist walking path. From 1993, the administration of Lūznava was located in the former manor house, in 1998 Lūznava Primary School was moved here, and from 2009 the library of Lūznava operated in the partially abandoned building. From 2011 to 2014, the restoration of Lūznava manor house took place, and the completely renovated building was opened in 2015. It is planned that in the future Lūznava manor could develop as an international center of environmental education and art, a place for organizing various camps and seminars. The park is well known not only for historical and architectural values, but for some natural values as well. Lūznava Manor is a home for several rare bats as well large diversity of tree species.

The recommendations were pre prepared while implementing project “LLI-476 IMPROVEMENT OF THE ENVIRONMENTAL CONDITIONS OF THE PUBLIC WATER BODIES IN LATVIA AND LITHUANIA (SAVE PAST FOR FUTURE)”, financed by Interreg V-A Latvia-Lithuania Programme 2014-2020. The project aims to increase capacity of organisations involved into restoration and maintenance of historical parks in complex with water bodies in North-East Lithuania and Latgale as important biodiversity objects by providing comprehensive management attitude on history, nature values and rural landscape. To improve water quality ponds in 3 parks – Anatalieptēs Monastery park, Kamariškiai Manor park (LT) and Preili Manor park (LV) – will be reconstructed and cleaned. During these works the emphasis will also be done on arrangement of the landscape and its adaptation for biodiversity protection. Knowledge and experience capacity for organizations involved in the project will be strengthened by organizing events for experience exchange with professionals and experienced field experts and active involvement of stakeholders into the elaboration of recommendations for the improvement of biodiversity status in 8 parks.

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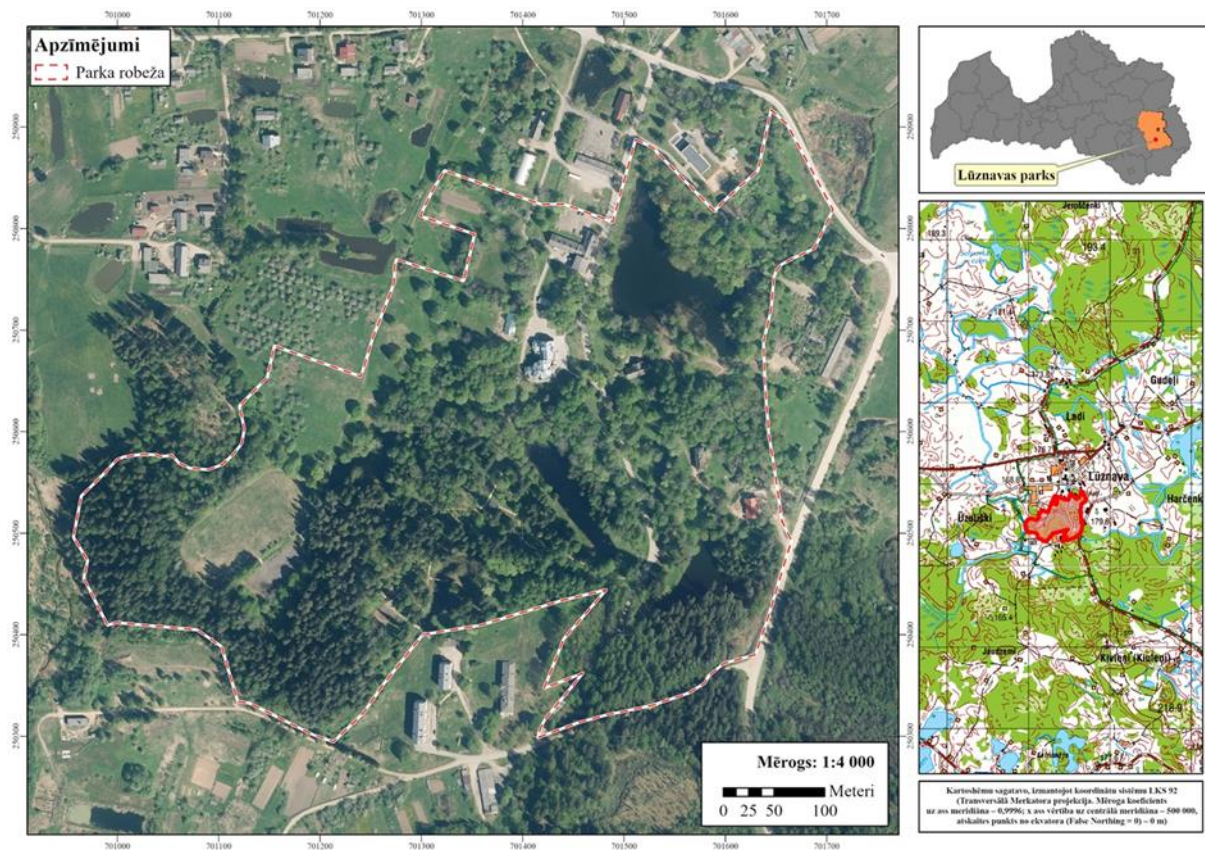


Figure 1. Location of Lūznava park

1. Natural values

Currently, the high biodiversity in the park of Lūznava manor is ensured mainly by the comparably big amount of old, hollow trees and system of shallow ponds which totally occupies about 2.6 ha. During the investigations, 15 veteran trees valuable for biodiversity and 2 valuable groups of oaks were inventoried (Figure 2). In addition, 40 trees potentially suitable for protected and rare invertebrate can be found in this territory. The scheme indicating localities of trees valuable for biodiversity in Lūznava manor park is provided in annex 1. Some of the trees growing in the park have reached the size of protected large trees (2 *Pinus sylvestris* trees) and have a special protection status. Moreover, forest habitat of European importance – 9050 Fennoscandian herb-rich forests with *Picea abies* are found in the park as well. Hollows, dead timber and other features characteristic to old trees is a habitat for various invertebrates, lichens, birds, bats, etc. such as moss *Neckera pennata* or lichen *Chaenotheca phaecephala*. Shallow ponds are habitats for protected dragon flies such as *Leucorrhinia pectoralis* and breeding places for some amphibian species (Figure 3). Moreover, water bodies, are particularly important feeding habitats for bats. Species specialized in the hunting of insects above the surface of the water are very common in Lūznava.



Figure 2. Natural values of Lūznava manor park: shallow ponds and old trees

Based on the investigations performed by experts from Daugavpils university, SIA “Dabas eksperti” and Foundation for Peatland Restoration and Conservation 22 protected species were inventoried in Lūznava manor park (Figure 3). The list of protected invertebrates, birds, bats, lichens and mosses species and the map of their localities is provided in annexes 2, 3.

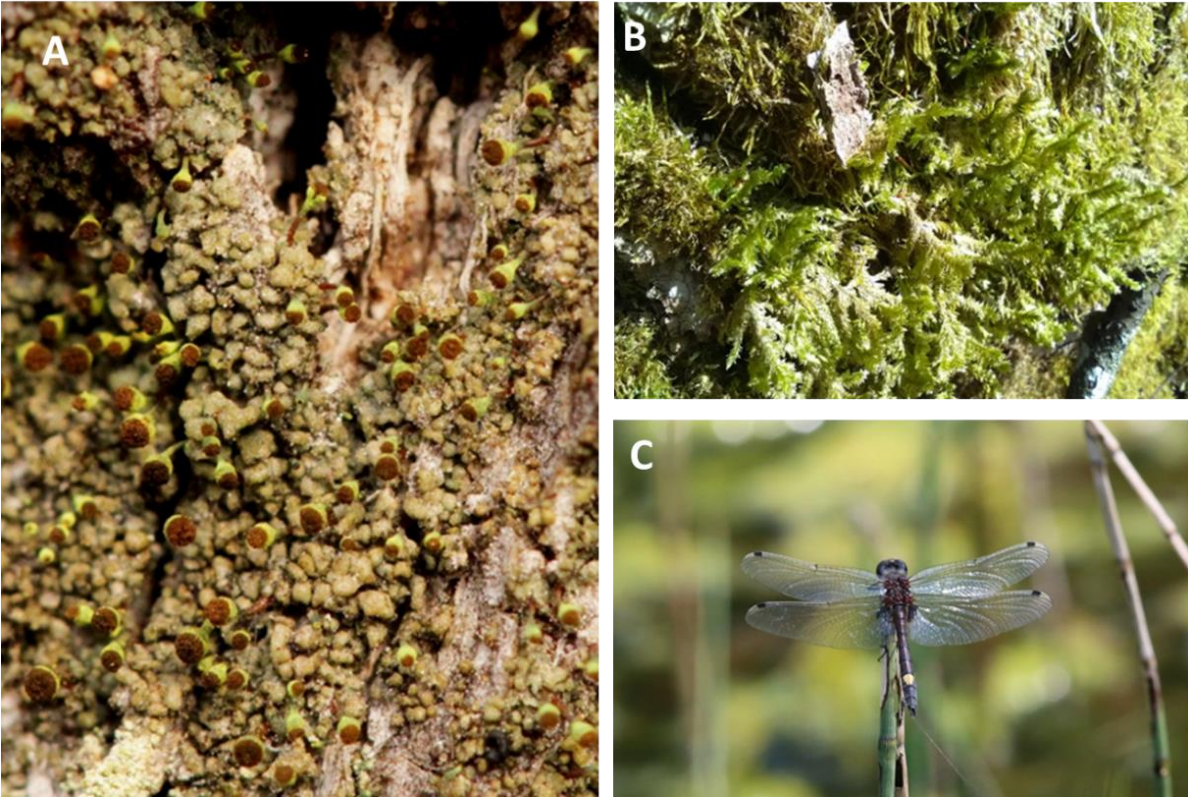


Figure 3. Protected lichen *Chaenotheca phaecephala* (A), moss *Neckera pennata* (B) and dragon fly species *Leucorrhinia pectoralis* (C) in Lūznava park. (Photos: R. Moisejevs A. Mežaka U. Valainis)

2. Recommendations for improving the conditions for biodiversity.

Successful management of manor parks is usually focused on maintenance of greeneries and preservation of historical values. However, these parks host a unique biodiversity, which must be maintained and secured as well. In order to make a planning process of park maintenance more efficient, we recommend to distinguish the priority zones. Two management priority zones were distinguished in Lūznava manor park: priority for natural habitat maintenance, priority for recreational zone maintenance (Figure. 4).

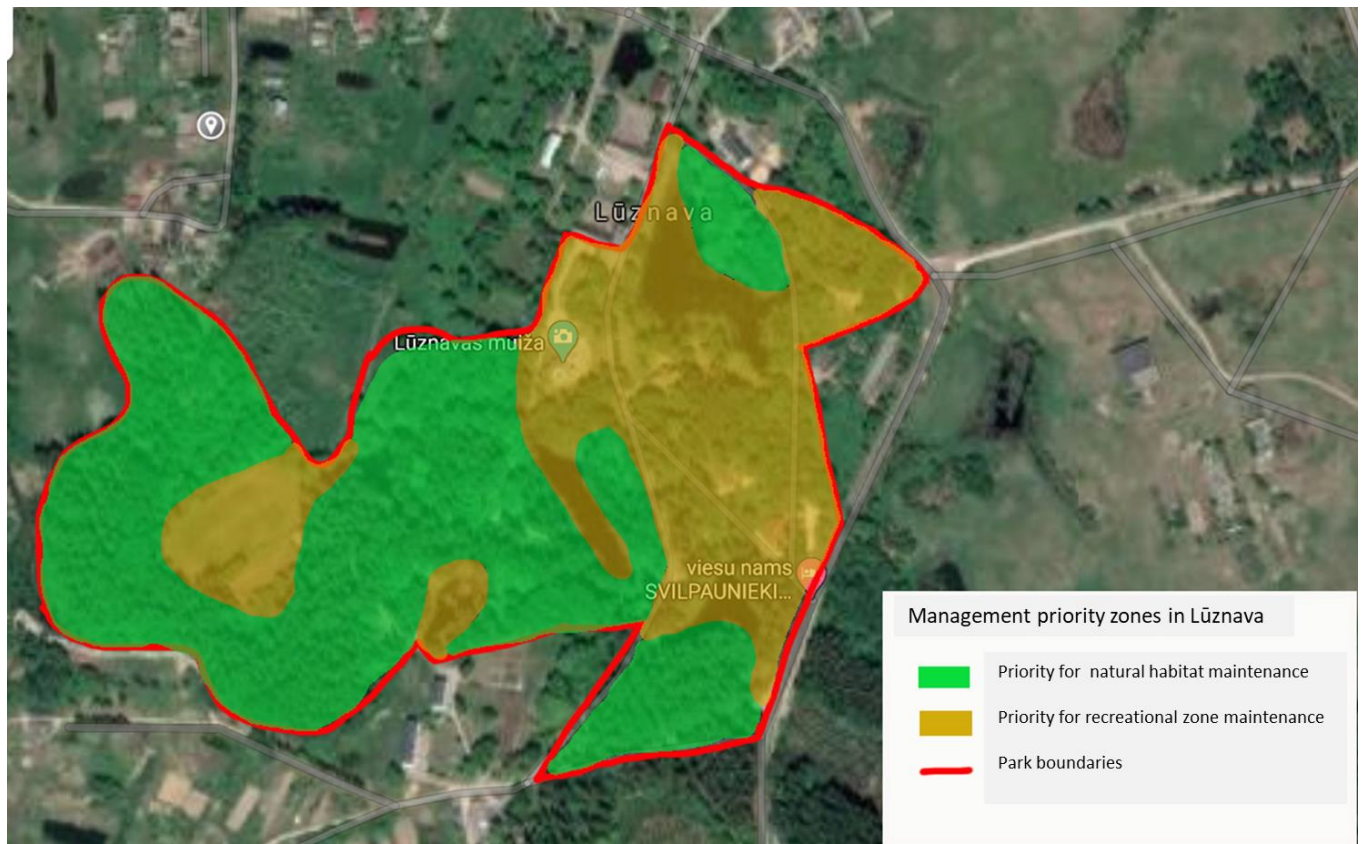


Figure 4. Management priority zones in Lūznava manor park

The zone of recreational priority occupies territory near the most visited objects such as manor, parking place, pathways, etc. Since this zone is commonly visited by people and has representative or recreational priority, management actions should be focused on well-being of visitors. Whereas, more remote parts of the park represented by biodiversity values should be managed extensively. However, it should be taken into consideration, that nature conservation actions should not pose any danger for the park visitors.

2.1. Recommendations for meadow habitat maintenance

Currently Lūznava manor park is mostly occupied by trees and shallow ponds and thus is lacking meadows of good ecological status. To maintain these valuable habitats the best practice from Bebrene and Preili manor parks might be followed. These parks are just a few positive examples of how biodiversity rich meadows can be preserved in an urban environment while making them attractive to visitors. In order to ensure the favorable conservation status of meadow habitats in Lūznava park territory the following actions might be recommended:

- to mow the tall grass and ruderal vegetation several times during the vegetation period and to cut the shrubs, leaving only valuable elements of the woody vegetation. The mowed biomass must be removed from the area;
- the frequency of mowing depends on the nature management priority areas: 1. in representative /recreational areas standard lawn care guidelines should be followed; 2. in areas

valuable for natural values (zones of biodiversity priority) late mowing should be performed, which is usually done twice a year in late July and in September;

- localization and cutting of invasive species;
- formation of “educational stripes” (1,0-1,5 m width), which would serve as a path for the visitors to enter the meadow (Figure 5).



Figure 5. Formation of “educational stripes” in meadows of Bebrene manor park

In Lūznava case there are not too many open areas, which could be dedicated for natural meadow maintenance. However, open field in the western part of the park might potentially become such a place. Although this part of the park has a priority for recreational activities, some patches of natural meadows could be maintained following the above-mentioned principles. In the long-time perspective these measures might even attract more visitors, who appreciate blooming flowers and biodiversity.

Other measures, such as grazing with cattle for nature management, educational or economic purposes or sowing of special meadow seed mixtures are also a favorable management method. However, in case of grazing it is necessary to ensure the protection of trees growing in the grassland area against possible damage to livestock. For raising the public awareness about importance of natural meadows special informational boards might be installed, which would provide information about meadow biodiversity and give answers why these habitats are mowed only in the second part of summer (Figure 6).



Figure 6. Example of correct way to maintain meadow and informational board about the nature values in Preiļi park.

2.2. Recommendations for maintenance of veteran trees and trees valuable for biodiversity

By creating the habitats for huge variety of species, old trees are one the most valuable element of Lūznava park. In order to ensure longevity and favorable conservation status of these trees several measures might be taken. These management measures and their description are provided in table 1. Maintenance of old veteran trees requires special skills and knowledge. Thus, it should be taken into consideration, that these actions should be implemented after the consultation with professional arborist or dendrologist.

Table 1. Recommendations for maintenance of veteran trees and trees valuable for biodiversity

Management measures	Purpose and description of the measure	Remarks
Tree cutting	When the danger posed by a tree is high or extreme. Near recreational infrastructure, buildings, etc. cases. Healthy invasive trees and shrubs are also removed.	Recommended for five trees in Lūznava park, which pose danger for the visitors.
Preservation of dead trees	To preserve the dead trees valuable for biodiversity or their stems without cutting them. The measure is applied in places which are not overcrowded by visitors. In this case visitors must be informed about the importance of dead trees. Leaving the timber of dead trees (branches, stems) on a ground as much as possible is also very important (Figure 7)	Recommended in Lūznava park.
Marking with special sign	Trees important for biodiversity are inventoried and marked with a special sign. These signs can be put not only on the trees but on the dead timber, which is left on the ground as well (Figure 7).	Successfully applied for two trees in Lūznava, but only on the living trees. Might be applied for the dead timber as well.
Surrounding the trees stems with the special fence	The stems of the trees are surrounded by a mesh fence (height of 2 meters) to protect the trees from the negative activities of visitors and beavers.	Not the first priority in Lūznava.
Tiding the tree crown	Tiding up the tree crown might help to avoid tree splitting and thus prolong the tree life	Might be recommended in Lūznava park for one tree after consultation with professional arborists.
Cutting of branches	Reductions of tree crown - dry, even small branches breaking and falling down break other branches and pose a threat to humans. Therefore, the crown should be thinned periodically by cutting up to 20% of all branches. These actions might also help to prolong the tree life.	Recommended in Lūznava park.



Figure 7. Example of leaving the dead timber in Bebrene manor park (left) and special sign which explains the value of dead timber for the visitors in Verkiiai manor park (Lithuania) (right).

15 veteran trees valuable for biodiversity were inventoried during the investigations. However, some of them were managed by professional arborists previously or grows in the remote sites of the park and thus do not pose significant danger for the visitors. Therefore, we recommend to make management actions for 13 of all inventoried old veteran trees and one group of oaks which consist of 7 trees (Table 2).

Table 2. The list of veteran and dangerous trees, which requires management in Lūznava manor park

Species name	Coordinates, WGS	Height (m), age (years), diameter (cm)	Conservation status	Natural value	Measures
<i>Thuja occidentalis</i>	56.358473, 27.261278	13, 80, 50	Satisfactory	Tree important from the dendrological perspective	Cutting of small dry branches
<i>Fraxinus excelsior</i>	56.359134, 27.263611	18, 35, 60	Good	no	To cut the tree, because it is dangerously leaning on the building
<i>Acer platanoides</i>	56.358968, 27.263709	16, 80, 60	Bad	no	To cut the tree, because dangerously leaning on the building
<i>Acer platanoides</i>	56.357635, 27.261480	10, 80, 67	Bad	Tree important for biodiversity	Cutting the dead dry branches
<i>Quercus robur</i>	56.355476, 27.261138	Group of 7 trees 45-90 diameter, approx. 120 year old, 20 m height	Satisfactory	Group of trees important for biodiversity	Cutting the shrubs around the oak trees

<i>Picea abies</i>	56.356146, 27.258609	31, 120, 83	Satisfactory	Tree important for biodiversity and from dendrological perspective	To mark with a special sign as a veteran tree
<i>Fraxinus excelsior</i>	56.356703, 27.260252	12, 60, 36	Bad (dead tree)	no	To cut the tree, because it poses danger for the visitors
<i>Populus tremula</i>	56.357072, 27.259840	24, 80, 68	Bad	no	To cut the tree, because it poses danger for the visitors
<i>Quercus robur</i>	56.357629, 27.260216	21, 130, 95	Satisfactory	Tree important for biodiversity	Cutting the dead dry branches
<i>Fraxinus excelsior</i>	56.067604, 26.131120	22, 120, 114	Satisfactory	Tree important for biodiversity and dendrology	Cutting the dead dry branches, which pose danger to the building nearby
<i>Picea abies</i>	56.357493, 27.260426	18, 60, 40	Satisfactory	Tree important from the dendrological perspective	Cutting the dead dry branches
<i>Tilia cordata</i>	56.357375, 27.260247	Tree with 12 stems, 20-60 cm diameter. Approx. age: 80 years, approx. height 20 m	Satisfactory	Tree important from the dendrological perspective	Cutting of dead dry branches and some of stems
<i>Fraxinus excelsior</i>	56.357284, 27.260509	21, 100, 109	Bad. Two stem tree is splitting	No	Tiding to stop the further splitting
<i>Fraxinus excelsior</i>	56.357189, 27.260943	20, 100, 82	Bad. Dead tree	Tree important for biodiversity	To cut the dead branches and form approx. 8 m height stem

2.3. Controlling the invasive species

Within the framework of the inventory of natural values carried out in Lūznava park, the inventory of invasive plant species has been performed (Figure 8). The further uncontrolled spread of these species may pose danger to the natural values found in the park. In order to reduce the risks of uncontrolled spread of invasive plant species several measures might be taken:

- Identification and localization of invasive species distribution;
- Constant mowing;
- Do not allow the formation of seeds;
- Biomass removal;
- Using chemical or phytopathogenic measures.

During the field studies 2 invasive species were found in Lūznava manor park: *Reynoutria sachalinensis* and *Heracleum sosnowsky*. Currently three different locations of *Reynoutria sachalinensis* can be found in Lūznava park (56.356297, 27.263096; 56.355513, 27.263341; 56.357487, 27.259681), which approximately occupies 20 X 30 m area each (Figure 8). The most effective way to control the distribution of *Reynoutria sachalinensis* is to treat the species with glyphosate or another chemical material, but this method cannot be used in close proximity to water. Constant mowing (monthly) stops growth, but does not destroy the stand. *Heracleum sosnowsky* was identified only in one place of Lūznava park. The most effective way of controlling the distribution of this species is constant cutting 3-4 times a year not allowing to produce the seeds. Small groups of *Heracleum sosnowsky* can be destroyed by digging them out. More information about invasive species and effective ways of their control can be found in the following link <https://www.daba.gov.lv/lv/invazivas-sugas>.



Figure 8. Invasive plant species *Reynoutria sachalinensis* in the territory of Lūznava park (Photo: U. Valainis)

2.4. Creating habitats for birds, bats, insects and other species

Creating the artificial habitats for birds, bats, insects and other species might significantly improve biodiversity status in the parks as well as making the parks more attractive for the visitors. These measures include installment of nesting boxes for the birds and creating artificial habitats for bats, insects and other species.

Lūznava manor park hosts a big variety of bird species. This is partly determined by the big amount of nesting boxes. However, currently most of them are constructed for the small insect eating birds. It should be noted that species such as owls, woodpeckers, common merganser (*Mergus merganser*), common goldeneye (*Bucephala clangula*) commonly breeds in the parks as well. Therefore, in order to improve their conservation status, it is recommended to create artificial habitats or construct nesting boxes. In Annex 4 we provide the main parameters of nesting boxes for some bird species, which includes: nesting box height, board width, hole diameter, etc (Source: Lithuanian Ornithological Society). For more guidelines how to construct these nesting boxes see the following link: <http://www.birdlife.lt/kokie-turetu-buti-inkilu-matmenys>

In Lūznava Park, as in many other dendrological plantations, there is a lack of hollow trees, which reduces the suitability of the park for the species of insects and other organisms inhabiting the cavities. In order to improve the conditions for the species living in the cavities, it is recommended to create and place artificial habitats imitating the cavities in the park. An experimental artificial habitat has been developed in Sweden and has also been tested in Lithuanian conditions. The man-made habitat is a wooden box about 3.5 m high, the upper part of which is adapted for nesting birds and bats, while in the middle and lower part is filled with decaying wood material characteristic of the interior of a wooden cavity and serves as a good habitat for insects (Figure 9).



Figure 9. Artificial habitat for bats, insects and birds in the Verkiai Regional Park in Lithuania, created within the framework of the LIFE project LIFE OSMODERMA (Photo: A. Banelienė (right), Scheme by M. Jasnauskaitė (left)).

For creation of artificial habitats suitable for insects, other alternatives such as insect hotels are also appreciated. These hotels are simply man-made replicas of the natural habitats these organisms search for in the wild. The most important feature of the hotel should be to keep it as natural as possible. A wooden frame can be filled with natural materials for nesting sites. Building items includes: sawn logs or wooden blocks with pre-drilled holes, bamboo or reed stems, dry leaves, sticks, strips of bark.

2.5. Other recommendations

Saving amphibians and reptiles. Parks are often represented by small ponds, which provides habitats for amphibians and other species. During the spring migratory season amphibians become very active and vulnerable. Protective fence for amphibians and reptiles can be used to protect these animals during the migration season by isolating their migratory paths. In addition, restrictions for vehicles traffic might be initiated or special signs informing about speed limiting might be installed (Figure 10). Lūznava manor park is currently crossed by the traffic road, which poses danger for migrating reptiles and amphibians, speed limiting and informational signs warning about migrating animals would significantly help to reduce number of dead amphibians and reptiles. These signs should be installed where road is located not too far from the pond.

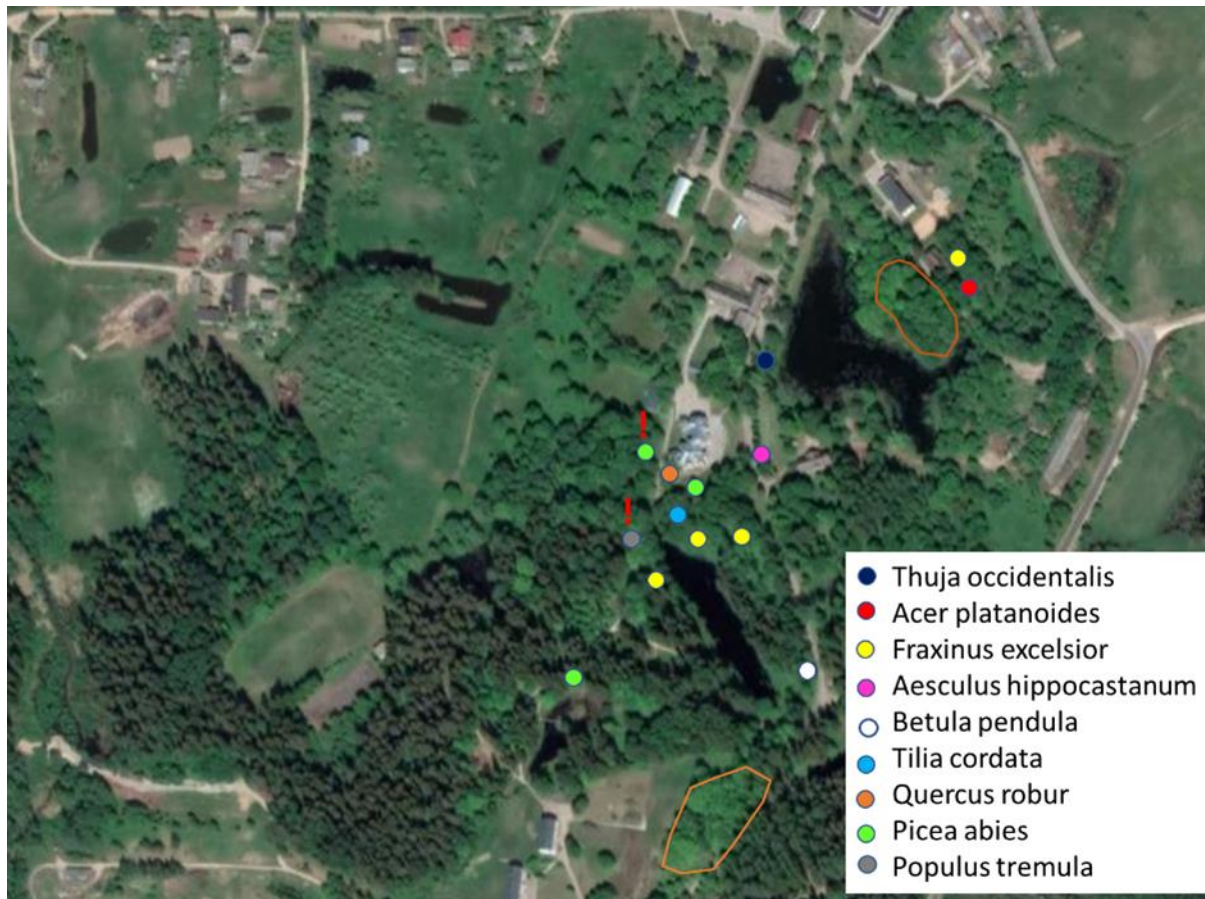


Figure 10. Grass snake fatally injured in the traffic road of Lūznava park (left) and special sign restricting the vehicle traffic in Lithuania (right).

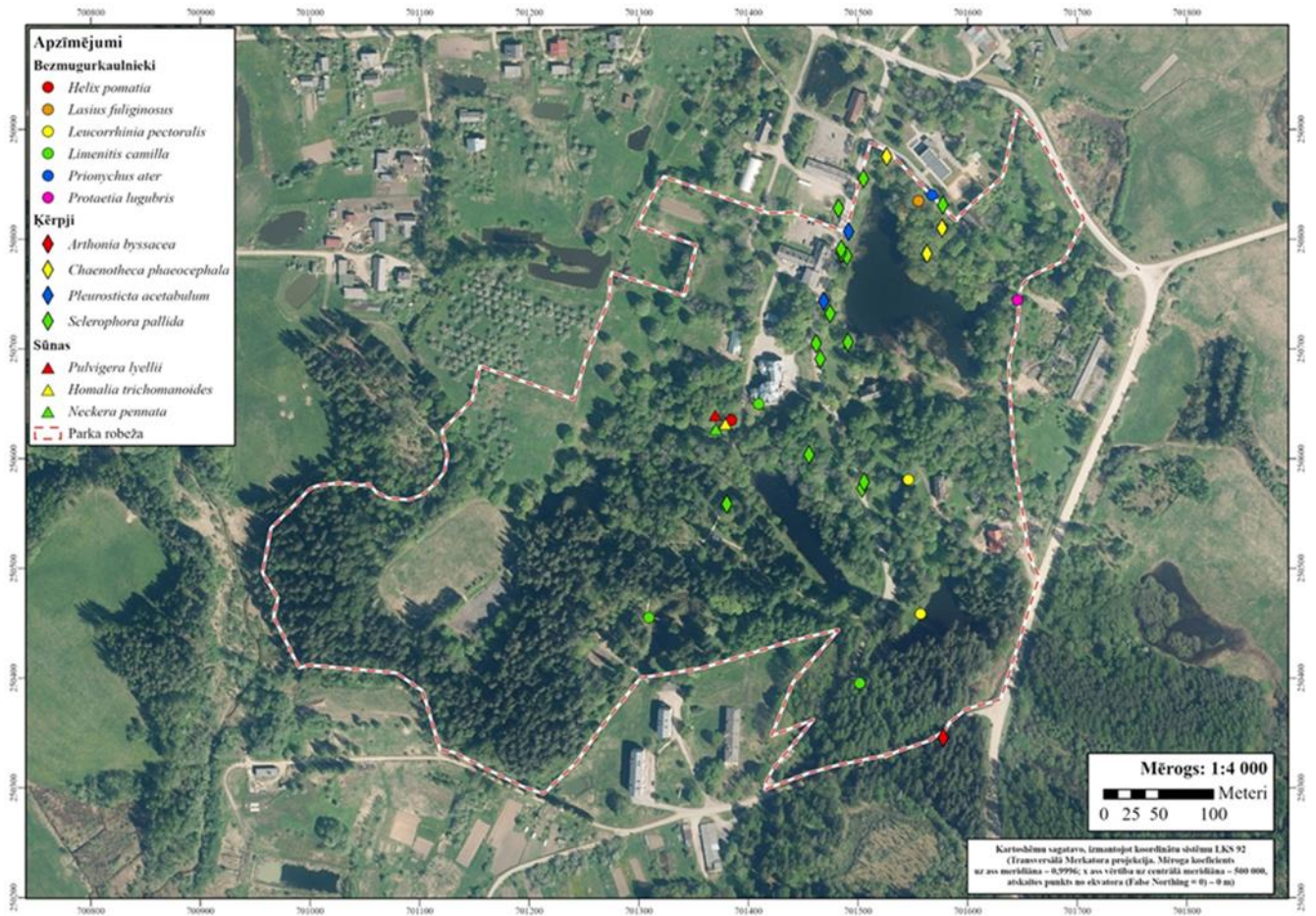
Improving conservation status of bats. Water bodies, such as ponds, rivers and canals, are particularly important feeding habitats for bats. For species specialized in the hunting of insects above the surface of the water, it is important that the surface is not covered by vegetation. It is also recommended to have trees on the banks of rivers or canals that create dark feeding habitats for bats in the evening. Most bat species avoid artificially lighted places during their night flights. From the point of view of bat protection, the less artificial lighting, the better. According to current knowledge, bat-friendly types of lighting don't exist. In areas where lighting is required for human safety reasons, such as park tracks, it must be fitted in such a way as to minimize its impact on the wider surroundings. The lamps must be as low as possible and the lighting shall only be facing downwards. A good solution is sensor-equipped lanterns, for which the lighting is switched on only when people are approaching. Often in parks, lighting is switched off in the middle of the night. Yet our earlier experience and data from this study show that, just at the beginning of the night, bat activity in the parks is the highest. Lūznava park is excellent sites for organizing educational events, or so-called bat nights. Informing the public about bat ecology and their conservation needs is one of the priorities for improving their overall conservation status

Annexes

Annex 1. The localities of trees valuable for biodiversity in Lūznava manor park.



Annex 2. The localities of the recorded rare and/or protected invertebrate and lichen species in Lūznava manor park.



Annex 3. The list of protected species inventoried in Lūznava manor park

Latin name	Latvian name	Red data book of Latvia	Other
Invertebrates			
<i>Helix pomatia</i>	Parka vīngliemezis		+
<i>Callimorpha dominula</i>	Nātru lācītis	4	
<i>Lasius fuliginosus</i>	Spožā skudra		+
<i>Leucorrhinia pectoralis</i>	Spilgtā purvuspāre		+
<i>Limenitis camilla</i>	Sausseržu raibenis	4	
<i>Prionychus ater</i>	Melnā praulvabole		+
Birds			
<i>Dendrocopos medius</i>	Vidējais dzenis		+
<i>Dryocopus martius</i>	Melnā dzilna		+
<i>Picus canus</i>	Pelēkā dzilna		+
Bats			
<i>Myotis dasycneme</i>	Dīķu naktssikspārnis	2	+
<i>Nyctalus noctula (Schreber)</i>	Rūsganais vakarsikspārni		+
<i>Vespertilio murinus L.</i>	Divkrāsainais sikspārnis	3	+
<i>Pipistrellus nathusii</i>	Natūza sikspārnis		+
<i>Pipistrellus pygmaeus</i>	Pigmejsikspārnis		+
<i>Plecotus auritus (L.)</i>	Brūnais garausainis		+
Lichens			
<i>Chaenotheca phaeocephala</i>	Brūngalvainā henotēka		+
<i>Inoderma byssaceum (Syn. Arthonia byssacea)</i>	Sīkpunktainā artojjija		+
<i>Pleurosticta acetabulum</i>	Kausveida pleirostikta	2	+
<i>Sclerophora pallida</i>	Sklerofora		+
Mosses			
<i>Homalia trichomanoides</i>	Tievā gludlape		+
<i>Neckera pennata</i>	Īssetas nekera	2	+
<i>Pulviger a lyelii</i>	Laiela pūkcepurene	2	+

Annex 4. Main parameters for some bird species nesting boxes

Bird species	Nesting box height, cm	Nesting box height (till the hole), cm	Board width, cm	Hole diameter, cm	The height in the tree (from the ground), m
<i>Parus major</i>	30	23	16	3-3,2	3-5
<i>Parus caeruleus</i>	27	20	15-16	2,8	3-5
<i>Parus cristatus</i>	25	18	14-15	2,8	3-7
<i>Ficedula hypoleuca</i>	28	21	15-16	2,8	3-5
<i>Phoenicurus phoenicurus</i>	23	14	18	5	4-6
<i>Picus viridis</i>	45	31	25	9	5-10
<i>Picus canus</i>	45	31	25	9	5-10
<i>Coracias garrulus</i>	45	34	24	6	5-10
<i>Upupa epops</i>	40	29	24	6-7	3-7
<i>Sitta europaea</i>	30	22,5	16	3,4-3,5	4-7
<i>Sturnus vulgaris</i>	35	26	19	5	4-7
<i>Apus apus</i>	35	26	19	5	6-15
<i>Strix aluco</i>	55	37	28	13	5-10
<i>Aegolius funereus</i>	45	31	28	9	5-10
<i>Athene noctua</i>	30	18	24	8	3-7
<i>Glaucidium passerinum</i>	40	29	24	6-6,5	5-7
<i>Tyto alba</i>	55	38	37-38	17*17	4-8
<i>Bucephala clangula</i>	55	38	28	12	2-10
<i>Mergus merganser</i>	65	42	37-38	18	2-10
<i>Strix uralensis</i>	65	45	37-38	20	5-10
<i>Coloeus monedula</i>	40	26	25	9	5-10

