

Final Project Report

Contestant profile

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| ▪ Contestant name: | Michał Szkudlarek |
| ▪ Contestant occupation: | PhD student |
| ▪ University / Organisation | University of Zielona Góra |
| ▪ Number of people in your team: | 4 |

Project overview

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| Title: | Significance of herpetofauna conservation in preserving biodiversity of Nowogród Bobrzański quarry |
| Contest: (Research/Community) | Research |
| Quarry name: | Nowogród Bobrzański |

Abstract

This project was a continuation and extension of project “*Measures to optimize habitat conditions within the KSM Nowogród Bobrzański*” which had been carried out by a team of scientists from Zielona Góra in the IVth edition of the Quarry Life Award (QLA) in 2016. Six years after the beginning of their project, in 2022, we repeated faunistic herpetofauna surveys of Nowogród Bobrzański quarry, what allowed us to gauge effectiveness of prior actions to repeat, broaden and modify them. The preliminary analysis allowed to carry out evidence-based and widely recognized conservation actions to increase environmental heterogeneity and provide proper microhabitats for hibernating, basking, sheltering, mating, foraging and oviposition of native amphibian and reptile species (i.e. herpetofauna). Moreover, we carried out comprehensive biological education of local community and visitors of Natural Centre (pl. *Centrum Nauki Keplera - Centrum Przyrodnicze*) in Zielona Góra city. All field activities were supplemented with photographic documentation and a photographic exhibition that complements and promotes the project .

Final report

Introduction

The project builds upon the results of research of previous project carried out in 2016 - “*Measures to optimize habitat conditions within the KSM Nowogród Bobrzański*” which was carried out by a team of biologists, naturalists and foresters in the IVth edition of the QLA in 2016. It being more comprehensive focused not only on herpetofauna, but also on flora (herbs, shrubs and trees), avifauna, entomofauna and ichthiofauna. However, it was during that project when a pond crucial for amphibians within the

Nowogród Bobrzański mine was built. In fact the quarry encompasses a sizeable and deep lake that was created due to ongoing sand and gravel extraction, though it is almost bereft of a littoral zone, vegetation and shallows, therefore amphibian population of that place is not species-rich and abundant since the lake is inhabited by several species of big predatory fish (e.g. the wels catfish (*Silurus glanis*), the zander (*Sander lucioperca*), the common perch (*Perca fluviatilis*), the pike (*Esox lucius*)). The lake is regularly supplied by local associations of anglers. The fish, despite being objects of predation of numerous black-headed gulls (*Chroicocephalus ridibundus*) and the great cormorants, unfortunately decimate most batrachofauna species – except the common toad (*Bufo bufo*), more toxic in every stage than other native species of amphibians. Other herpetofauna-oriented activities completed in the previous project include creation of ecological corridors, stony plot, sawdust mound, branches heaps and decaying plant matter heaps – aiming at increasing number of safe shelters in this once almost open and heavily insolated area.

The main goal of the project was to explore the role and effects of herpetofauna conservation in preserving the biodiversity of the quarry in Nowogród Bobrzański and to undertake new measures. We evaluated effectiveness of herpetofauna-oriented actions undertaken in 2016 during the previous QLA project that was carried out in the quarry. Back then, both the quarry and adjacent areas (forests, the valley of Bóbr river, barren lands) were surveyed. The following species were observed: smooth newt (*Lissotriton vulgaris*), common toad (*Bufo bufo*), green toad (*Bufo viridis*), natterjack toad (*Epidalea calamita*), European common frog (*Rana temporaria*), pool frog (*Pelophylax lessonae*), marsh frog (*Pelophylax ridibundus*), edible frog (*Pelophylax kl. esculentus*), sand lizard (*Lacerta agilis*), viviparous lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*) and grass snake (*Natrix natrix*).

Another goal of our project was to increase ecological knowledge of the local community, focusing on schoolchildren. We focused on schoolchildren and in their case the emphasis was put on the aspect of the quarry's biodiversity. In our endeavors we hoped to restore natural species richness of herpetofauna of the area covered by the project.

Methods

Faunistic analyses and assessment of conditions of populations and ecosystems were based on ca. twenty field surveys.

Methods of habitat management included:

1. building a shallow pond,
2. removal of dead organic matter from pond created during the previous QLA project,
3. exposing coastal zone of the reservoir to increase its insolation,
4. removal of superfluous shrubs and seedlings of trees to create insolated plots that meet requirements of heliothermic taxa (e.g. sand lizards),
5. using plant material for revitalization of existing and creation of new ecological corridors enabling migrations of animals prone to drying out (e.g. smooth newts) that also provide shelter, foraging and basking grounds for reptiles and other animals as well (e.g. hedgehogs),
6. arrangement of heaps of stones so that they constitute basking spots for lizards,
7. erection and replenishment of sawdust mound, a structure that grass snakes (*N. natrix*) used for oviposition during the previous QLA project,
8. creation of heaps consisting of local logs, bark, leaves and branches, some of which were the result of our vegetation management measures.

We used different methods to carry out ecological education.

1. Classes with schoolchildren of a local elementary school during which we:
 - a. talked about wildlife of quarries, local amphibian and reptile species, their relevance, ecology, natural history, and our QLA project,
 - b. presented some interesting and common water invertebrates like dragonfly larvae (Odonata), great diving beetles (*Dytiscus marginalis*), water scorpions (*Nepa cinerea*), pond skaters (*Gerris lacustris*), water boatman (*Notonecta glauca*),

- c. let pupils use *Seek by iNaturalist* app to identify and learn about local species on their owns,
 - d. used games and worksheets (see Appendix 1.) to teach about local herpetofauna in an engaging way.
2. Photographic exhibition about the quarry's herpetofauna and this Quarry Life Award project held in Kepler Science Centre – the Nature Centre in Zielona Góra City (opened 26.08.2022)
 3. Citizen science project at the iNaturalist platform to document and identify the living nature of Nowogród Bobrzański area. So far the project has gathered 152 observations spanning over 106 species – <https://www.inaturalist.org/projects/quarry-life-award-przyroda-nowogrodu-bobrzanskiego-i-okolicy>

Results

Within the Nowogród Bobrzański quarry in period between March and August of 2022 we observed seven species of amphibians:

- smooth newt (*Lissotriton vulgaris*),
- common toad (*Bufo bufo*),
- European grass frog (*Rana temporaria*),
- moor frog (*Rana arvalis*),
- edible frog (*Pelophylax kl. esculentus*),
- marsh frog (*Pelophylax ridibundus*),
- pool frog (*Pelophylax lessonae*),

and three species of reptiles:

- sand lizard (*Lacerta agilis*),
- slow worm (*Anguis fragilis*),
- grass snake (*Natrix natrix*).

Photographic and in some cases also video documentation has been made. In 2022 we observed and documented reproduction of all abovementioned species – except for a slow worm (*Anguis fragilis*), a secretive lizard, which has been found only once.

Small pond that we built was located close to the big one and has quickly been inhabited by grass snakes (*Natrix natrix*) and green frogs of the *P. esculentus* complex. The pond, though shallow, retains water even in very dry and drought-like conditions. Both ponds are fish-free, and unpolluted due to being located in a closed area.

Structures that were supposed to provide proper microhabitats, like heaps of decaying plant matter, sawdust mound, ecological corridors, were used by sand lizards (*Lacerta agilis*) and grass snakes (*Natrix natrix*), species which were very common in the project area. No eggs of these reptiles were found. However, judging by abundance of offspring, both enjoyed reproductive success, most likely due to the project's actions. Green frogs of *P. esculentus* complex and smooth newts (*Lissotriton vulgaris*) were also very common there and enjoyed great reproductive success.

Education of schoolchildren was met with huge enthusiasm of the pupils, teachers and the headmistress.

Discussion

Herpetofaunal species richness was lower than the one reported by another team six years ago. However, it can be explained by dissimilar methodology. Namely, we surveyed much smaller area.

The area that we focused our endeavors on, got covered with a dense vegetation including trees that quickly regrow upon cutting – probably due to locally high groundwater level. It is also the reason for the shallow and small pond retaining water even during this year's drought.

The study site is located in southern part of Lubusz Voivodeship (Western Poland). According to Najbar et al. 2017, area of Nowogród Bobrzański is occasionally inhabited by the smooth snake (*Coronella austriaca*). We might have not encountered it due to the species rarity, secretiveness and the surveyed area being away from the places where smooth snakes were observed. Regarding amphibians, the surveyed area lies within distribution ranges of some species that we have not observed. Namely, great crested newt (*Triturus cristatus*), alpine newt (*Ichthyosaura alpestris*), fire-bellied toad (*Bombina bombina*), spadefoot toad (*Pelobates fuscus*), European tree frog (*Hyla arborea*), natterjack toad (*Epidalea calamita*) and European green toad (*Bufo viridis*). Though, the unused part of the quarry is not sizeable enough to meet habitat requirements of all these species. However, it is highly probable that some of these species (*T. cristatus*, *H. arborea*, *B. bombina*) will inhabit that place in the future.

Our project exemplifies and emphasizes the role of human activity in increasing environmental heterogeneity, which, in synergy with the proximity of relatively unaltered ecosystems, translates into increasing local biodiversity.

In the process, the quarry became publicly known (among the youth and the teachers) to be a local herpetofauna hotspot, what undoubtedly has a positive impact on the company's image.

In the future we recommend to continue surveying, education and measures to counteract overgrowing of terrestrial habitats (e.g. sand lizards require insolated microhabitats for basaking and oviposition) and water bodies – places crucial for reproduction of native amphibians. We also suggest building more ponds as it turned out to be a cost effective way to create ecotones and habitats necessary for reproduction of amphibians. An ideal timing for that is winter since in that case the pond can be inhabited and used even from the upcoming spring onwards.

Final conclusions

- Thanks to carrying out some measures and regular faunistic observations by several experienced naturalists, we conclude we fully met the previously established goals.
- We restructured selected plots intended for particular amphibian and reptile species of our interest and by the way also thermophilic insect and plant species.
- The biggest reproductive success was enjoyed by smooth newts, which became common within the quarry, but also by green frogs and sand lizards.
- Amphibian species new to the area have been observed.
- We suggest continuing the actions to further improve quality of habitats, prevent terrestrial and aquatic overgrowing, shallowing, eutrophication, creation of anaerobic zones (worsening of water quality) and progression of reeds into the middle of the ponds.
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Bibliography

Gady powiatu zielonogórskiego i miasta Zielona Góra, 2017, Anna Najbar, Bartłomiej Najbar, Magdalena Wieczorek, Zielona Góra: Oficyna Wydaw. Uniwersytetu Zielonogórskiego, s. 126, ISBN: 9788378423089

Project tags (select all appropriate):

This will be use to classify your project in the project archive (that is also available online)

Project focus:

- Beyond quarry borders
- Biodiversity management
- Cooperation programmes
- Connecting with local communities
- Education and Raising awareness
- Invasive species
- Landscape management
- Pollination
- Rehabilitation & habitat research
- Scientific research
- Soil management
- Species research
- Student class project
- Urban ecology
- Water management

Flora:

- Trees & shrubs
- Ferns
- Flowering plants
- Fungi
- Mosses and liverworts

Fauna:

- Amphibians
- Birds
- Insects
- Fish
- Mammals
- Reptiles
- Other invertebrates
- Other insects
- Other species

Habitat:

- Artificial / cultivated land
- Cave
- Coastal
- Grassland
- Human settlement
- Open areas of rocky grounds
- Recreational areas
- Sandy and rocky habitat
- Scree
- Shrub & groves
- Soil
- Wander biotopes
- Water bodies (flowing, standing)
- Wetland
- Woodland

Stakeholders:

- Authorities
- Local community
- NGOs
- Schools
- Universities