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Citizen Science with School Students for Nature Conservation of a Scorpion Species

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The northernmost outpost of the distribution area of *Euscorpius tergestinus* (Triestino Scorpion) is Krems (Austria). This species is included in the red list of Austria as "threatened with extinction". Nonetheless, nobody knows about the status of this population. The latest publications on these topics are at the minimum 35 years old and anecdotal with vague estimations about possible threats. Therefore, policy, nature conservation and management lack data. This project unites local school students from an elective biology course aged 16-17, their biology teacher with an arachnologist and a biology educator. Research on this threatened species is done in the framework of Citizen Science (CS) with students as co-creators of the research and laypersons as contributors of data via questionnaires, followed by mapping of the project team. The aims are to find out what the inhabitants of Krems know about the scorpion population and to evaluate its status for policy makers and nature conservation. This contribution describes the CS approach and the overall design of the project as well as some results.

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1. Introduction

Scorpions are very interesting and fascinating animals, appealing to humans for different reasons, which can be seen in myths and the beliefs in the star sign or in showing fear and disgust. Moreover, scorpions were used as ingredients for medicine in former times, therefore were objects of trading [1]. In Krems (Lower Austria) the northernmost outpost of the distribution area of *Euscorpius tergestinus* (Triestino Scorpion) can be found, first scientific reports can be traced back to the 19th century [2] in a small area within the city, maybe a consequence of mediaeval trading. This species is included in the red list of Austria as "threatened with extinction" therefore authorities should take care of this population. Nonetheless, nobody knows about the status of this population. The latest publications on these topics were at the minimum 35 years old and anecdotal with vague estimations about possible threats [3]. Therefore, policy, nature conservation and management lack data. A project application was written in 2016, a small sub-project wanted to conduct research about the scorpions in Krems with local schools. The project proposal was rejected; the students in one school were very disappointed. Therefore, the author visited them, to share his knowledge about the literature on this zoological speciality, the teacher and the students nonetheless wanted to make a project to learn more about this specific occurrence of this species. Hence, this was the starting point of the - from this meeting on - co-created and in some aspects even collegial CS project [4,5].

1.1 Aims of the Project

CS projects do not have only scientific goals but often other benefits as well [6]. In this project, one foremost goal is to build awareness, build up local knowledge about the scorpions in the community of the town (students, teachers, garden owners, citizens, and nature conservation people). Moreover, the actual status is also in focus, to have a basis for nature conservation decisions [5]. For the school students this project is the opportunity to participate in scientific research, to learn about the whole research cycle [5] as well as to link science education with environmental education [7].

1.2 Roles within the Project

Defining roles in projects where school students with their teachers and scientists cooperate is important, as different roles bring in different strengths [8]. Co-creation with students was possible because they opted for an elective module in biology at upper secondary level. Moreover, the biology teacher was willing to cooperate with a longer perspective. The curator of arachnids of Natural History Museum of Vienna very soon joined the team with his expertise. This core team asked laypersons to be data contributors. An important role took the local and regional media for communication between the project team and the public.

2. Methods

Within the CS approach, two ways of collecting data were chosen: 1) A questionnaire for the laypersons in Krems with questions about sightings. Moreover, the students wanted to know more about attitudes towards the animal; we got the contributions from public via face to face questioning and open calls in local media. 2) After the collection of sightings from public, the

team started field work and mapping with UV-torches to prove the occurrence and map the area of the actual distribution.

3. Results

The results in detail were published open access in early 2020 [9]. In this contribution, additional aspects of the successful CS project are presented.

Local press was continuously informed and therefore nine articles within five newspapers on paper were published within one year. Far more than ten online articles could be found, some of them representing an online version of the paper issues, others found in online media only. Moreover, three radio features were broadcasted regionally and nationally, articles in local NGO nature conservation journals published. A final public presentation was held at the end of the project by the whole team in school.

Due to the media coverage, we got data from over 70 persons until now via questionnaires and e-mail and from some more via personal communication. A general trend shows, that this species is of high interest to the public, inferring from stories that were sent to us about the circumstances of the sightings or the photos. The questionnaires also showed high interest (more than 50% of respondents, N=42) with very low percentage of disgust or fear (7% in each category, N=42). Most of the sightings concentrated within the small area [2,3], but other sites were reported in the valley of Wachau, the valley of river Krems and across the river Danube.

Mapping during nights on about 30 different sites could confirm the population in the area, which was known since the 19th century (12 sites) [2,3,9]. Remote sites with reports were visited but occurrence could not be confirmed there (~ 18 sites). It seems that this zoological specialty has stayed since the late middle ages within an area of about 4 hectares with no further spreading so far.

4. Discussion & Outlook

Due to resonance in local media and the work with a local school the aim of creating local knowledge about this zoological specialty “the scorpion from Krems” could be reached [5,6]. This also applies to the aim of creating knowledge for nature conservation authorities. Garden owners wanted to help the team with the school students; therefore, awareness and appreciation for this scorpion population increased. Further analysis on this topic could be interesting; e.g. how did the public media report about the project?

Another key to success was the close cooperation between school, scientists and laypersons. The work was distributed between the roles but nearly everything was shared and communicated within the project team. Therefore, a final publication was written in teamwork [9]. In the public presentation, all members took responsibility for different aspects. Therefore, the students participated in the whole research cycle [4]. Further research on the learning of the students with their individual learning outcomes is planned.

Finally, the project continues! A subsequent group of motivated students in the elective module for biology asked for continuation and new research questions arose. Therefore, the co-creation of the research is postponed.

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