

WORKPACKAGE 1 – BIODIVERSITY AND PERCEPTION

DELIVERABLE 1 – REPORT ON BIODIVERSITY'S DATA

CONTEXT

GENERAL CONTEXT

Biodiversity is today a very-well studied subject, even if data on particular species or environment are still lacking. The general awareness about importance of biodiversity and its protection leads to a vast and diverse academic work in this field.

Nevertheless, urban environments are usually less studied than other ecosystems seen as more “natural”. The biodiversity of cities is often underestimated, and few species benefit from programs of protection. Data regarding urban biodiversity are not frequent, but they still exist. Besides data acquired through citizen science programs (which is the subject of Deliverable D2), some academic programs aim to register urban species, their habits, their health.

It also happens that some cities, not wanting to protect a species, but wanting to exterminate or chase it, request academic study of this species. The aim is different but results in terms of data can be quite the same, and could be used the same way.

INSIDE THE PROJECT

This project will partially follow the methodology set for a previous study (Delahaye 2021) of another urban species (*Rattus norvegicus*) in another urban environment (Paris, France). This study showed that it is possible to learn a lot of things about the relationship between humans and liminals by comparing semiotic representations to factual data. A first step is, consequently, to gather and analyse data about biodiversity in Tartu, in particular about corvids, our case-study, and even more especially about the main species of this project, *Corvus corone cornix* (or *Corvus cornix*).

RESEARCH QUESTION AND HYPOTHESIS

QUESTION AND SUBQUESTION

This deliverable is part of the Case study 1, aiming to study the relationship between biodiversity and perception of such biodiversity on different semiotic levels. The main question of this Case study is: What are the roles of liminal species in a human city?

The report on biodiversity's data aims to answer more specifically to the question: What do we know about the current state of biodiversity in Tartu city, especially regarding corvids?

HYPOTHESIS OF THIS STEP

The general hypothesis of the Case study is that cities are perceived as an exclusively human environment. It is true that biodiversity in cities is expectedly still lower than in most natural ecosystems, yet it is present, complex and changing. So, humans and animals are parts of these ecosystems, interacting permanently with each other and strongly semiotically linked.

The hypothesis of this precise step is that, based on the previous study on rats, there is probably a gap between the perceived biodiversity and the real data. Gathering biodiversity's data on corvids is consequently an important part to understand how big this gap can be, and, further, how humans are creating representations about liminals that are more or less close to the factual reality of these species.

METHODOLOGY

METHODOLOGICAL CHOICES

On advice of Veljo Runnel (University of Tartu Natural History Museum and Botanical Garden) two different kind of sources for data were used.

The first one is the project Bioveins, an European project which aim was to monitor biodiversity of various species (from bees to bats, including birds) in different cities in Europe, including Tartu and Paris, to see "How does nature circulate through cities". The link to the project website is available in the Annexes. The Estonian contact for this project is Lauri Laanisto (Estonian University of Life Sciences).

The second one is the monitoring of crows in Tartu, a field work requested by the city officials in order to address complains of Tartu's citizens about corvids. The report of this study can be found in Annexes. The contact for this project is Marko Mägi (Institute of Ecology and Earth Sciences of Tartu).

Both sources were analysed in order to understand several aspects of ecological behaviour of corvids, and how this behaviour can be, or not, semiotically relevant for humans:

- What is the actual density of the population? This information is important to understand the perception of corvids population from human points of view.
- Are there behaviours that could be perceived as problematic by human beings (violent, destructive, noisy)? Which ones and why?
- What behaviours can be signs of animal agency? This information will be critical for all the Exploitation deliverables.

ISSUES AND PROBLEM SOLVING

Two issues occurred during this step.

- **About the Monitoring of Crows in Tartu:** the entire report is only available in Estonian. If this is not a problem when exploiting raw data (like it is the case in Deliverable D2), this report also contains analyse and interpretation made by the researchers. They should be taken into account, because they are part of the expertise shown in this report. This was solved by requesting an interview with Marko Mägi, who kindly accept to detail the experimentations that lead to the report and the interpretations made of these results. He also explained some aspects that were not clear and pointed out some point of vigilance (listed in the Points of vigilance section).
- **About the Bioveins project:** it was difficult to know who has access, and therefore can grant access, to the data. For unknown reason, if some data of the project are already available about bees (Casanelles-Abella et al. 2021) or bats (Villarroya-Villalba et al. 2021) , it is not the case for birds. Veljo Runnel did an important part of the field work in Tartu, but the Estonian coordinator of the project was Lauri Laanisto, who explained that data regarding birds were gathered by the French team. The contact was Nicolas Deguines (University of Poitiers, France), but it appeared that the person able to grant access was if fact François Chiron (University of Paris-Saclay, France), who seems to not be very available. Four weeks after data request, and three weeks after this request was technically accepted, the data are still to be received.

POINTS OF VIGILANCE

The following points of vigilance were pointed out, mainly by Marko Mägi:

- **Difficulty to follow specific group or individuals:** in Tartu, corvids are not marked, as opposite to Paris, where crows (*Corvus corone*) from the Museum flock are marked, letting people know if individuals are moving from flock to flock, or if the flock itself changes of area. This is not possible to say in Tartu, and movements of flock can only be deduced from the differences between one season and another, between occupied and deserted areas. It is therefore possible that a significant part of individual initiatives can not be spotted.
- **Lack of data about other species involved:** the semiosphere of crows implies interactions with other species that modified the way they perceived the world and consequently their behaviour. Some behaviours (of foraging or alarm calls) are directly related to the presence of other species, and their influence must be taken into account for generalization of analyse and solutions. For some species (*Coloeus monadelus* or *Corvus frugilegus*), data exist and can be used to map the semiosphere of crows (*Corvus cornix*). But for some species, especially insects, that could explain different foraging behaviours, data are lacking.
- **Fragility of some conclusions:** due important variations of crows, in number and localisation, from one year to another, conclusions presented in the used sources should be seen as only provisory conclusions. Any more recent or complete data should be added and compared in order to obtain more accurate description.

RESULTS

RAW RESULTS

ABOUT THE ACTUAL DENSITY OF THE POPULATION

The monitoring of crows in Tartu shows that corvids flocks vary more in size and number of individuals between months, through one year, than between years (see Figure 1). The population is stable, no particular augmentation is registered, nor sudden drop of population. This stability seems completely independent of the use of noise generators in order to make crows fly away from certain specific areas. These systems are quite probably a nuisance for crows, but it is clearly perceived as a discomfort and not as a threat after a short period of habituation.

Bioveins' data are still waited.

ABOUT POTENTIAL PROBLEMATIC BEHAVIOURS

The monitoring of crows in Tartu shows no clear potential problematic behaviour. During interview, Marko Mägi gave the example of a pair of crows that attacks humans and show aggressive behaviour during nesting period, approximately two weeks every year, at the Raadi cemetery. This behaviour is described by the zoologist as "exceptional" and "a matter of personality", rather than a regular cohabitation's issue. Some other attacks may occur locally, but were not observed during the study.

Bioveins' data are still waited.

ABOUT POTENTIAL AGENCY BEHAVIOURS

The monitoring of crows in Tartu shows that changes in behaviour are not easily controlled by humans, and that the intelligence of crows allows them to make agent choices. During the experimentation with noise generators, crows were frightened as intended during a period of few months, with an important change in nesting behaviour. But quite quickly, they seem to understand that there was a semiotic gap: the sign was not

congruent if the sense, the noise announcing a threat was not a real threat. After that, they return in the areas where the noise generators were still in place. They seem to stay for a less long time there than before, but this does not seem to have an impact on the density of population or the number of occupied nests.

INTERPRETATION

ABOUT THE PERCEPTION OF POPULATION'S DENSITY

As it has been observed before in the Paris study of rats, liminal species, over perceived as overpopulating, are in fact quite stable. This information will be used during the perception's analysis (Deliverable D3) in order to spot a gap between perception and factual data in this aspect.

Bioveins data would be added in interpretation if relevant.

ABOUT COMPLAINS REGARDING BEHAVIOURS

Most of the complains are against very ethological behaviour. If some attacks can indeed occur rarely, Marko Mägi stated that, prior to the launching of the monitoring of crows in Tartu program, "90% of complaints are about noise". Additionally, Lauri Laanisto also reported observations from the Raagi cemetery, where crows are grabbing and "stealing" candles from graves, presumably in order to eat the very calorific paraffin wax, leaving them sometimes hundreds of meters astray. It would be quite understandable that this behaviour would be perceived as an aggression from grieving families.

Bioveins data would be added in interpretation if relevant.

ABOUT ANIMAL AGENCY

The quick adaptation to noise generators is an interesting sign of animal agency, and of the ability to make a difference between a thing and the sign of a thing. Crows understood completely that the noise was a "deceiving sign" and are not frightened anymore. Still, they stay for a shorter period than before in these areas. The noise used in the generators was conceived to be unpleasant for them, it is possible that this change in behaviour demonstrate "comfort preferences": a kind of preference that reveals or more complex perception and appreciation of one environment.

It is also to be noted that, regarding certain extreme behaviours, like aggression toward humans, Marko Mägi talked about "personality", indicating that the variation of behaviour can be important inside a group, and be the sign of a complex cognition and individual construction. This is slightly problematic for tentative of generalized solutions, as variation between individuals create more hazard, but it is also the sign of a rich semiosphere with which I may be possible to interact.

Bioveins data would be added in interpretation if relevant.

MILESTONE 1 – PROGRESS REPORT

IMPACT OF RESULTS

These results are only preliminary (and even, for the moment, incomplete) but they can be useful, once crossed with other deliverables:

- With Deliverable 2: the comparison between actual biodiversity and perceived biodiversity can reveal a gap between facts and perception.

- With Deliverable 3: the comparison between the factual behaviour and all the semiosis around it (cultural meaning, symbolical meaning, emotional meaning) could also be relevant, if some of these human perceptions can be related to factual behaviour elements.

The impact of these results will be included in the first set of recommendations and propositions for exploitation (see document EX1).

ISSUES, PROBLEMS OR LACKING

The results must be considered as incomplete without a cross-analyse of the perceived biodiversity, in particular from the active and involving point of view of the citizen science. Deliverable 2 was created to focus on the aspect, the cross-analyse will be done for Deliverable 4.

NEXT STEPS

Results of this deliverable will be analysed jointly with results of Deliverable 2 (Citizen science programs' report) and compared. The aim will be to find gaps, paradoxes or overlaps between them, and to create a more precise map of the perceived biodiversity compared to the factual one.

If relevant, they will also be compared to results of Deliverable 3 (Nature perception's report) to see in the perception described in textual materials is consistent with the perception emerging from the comparison of biodiversity's data and citizen involvement in biodiversity science.

GENERAL PROJECT – CURRENT STATE OF PLAY

IMPACT OF RESULTS

These results are not exploitable on their own, even more giving the fact that they are, for the moment, incomplete. But they can be used as starting points in two major aspects of the project. They can give us biological and factual roots, explaining some humans' perceptions towards corvids. They can also be used as example for developing more complete, accurate and relevant methodologies in biodiversity monitoring in cities.

PROPOSITIONS FOR OTHER ASPECTS OF THE PROJECT

ACADEMIC ASPECTS

These results can be exploited in the academic field in two aspects: learning what can of relevant information should be gathered in future field work for biosemiotics exploitation, and showing how the extract animal agency information from raw data.

These two aspects can be included, if relevant, in the proposition of first paper of the project (see document P1), but it will more probably remains a modest contribution, worthy to be mentioned in communication at a conference (see document C1).

POPULARIZATION ASPECTS

These results could be interesting in the dissemination part, after comparison with symbolic perception (Deliverables 3 and 4). Indeed, explaining what biological facts or factual aspects of behaviours of a species can lead to a symbolical or a cultural semiosis around it is a good way to propose reflexion to people about what they think and why about these individuals, and what consequence this semiosis can have.

NEXT STEPS

These results are important for the Workpackage 3, and will be taken into account in further field observations, especially regarding the interactions toward humans, the moving through the year of the different flocks and the interactions between species, in particular between species of the corvids' family.

ANNEXES

REFERENCES AND LINKS

REFERENCES

- Casanelles-Abella, Joan, Stefanie Müller, Alexander Keller, Cristiana Aleixo, Marta Alós Orti, François Chiron, Nicolas Deguines, et al. 2021. « How Wild Bees Find a Way in European Cities: Pollen Metabarcoding Unravels Multiple Feeding Strategies and Their Effects on Distribution Patterns in Four Wild Bee Species ». *Journal of Applied Ecology*, octobre, 1365-2664.14063. <https://doi.org/10.1111/1365-2664.14063>.
- Delahaye, Pauline. 2021. « Rats, Mice and Humans ». *Linguistic Frontiers* 4 (1): 44-52. <https://doi.org/10.2478/lf-2021-0004>.
- Villarroya-Villalba, Lucía, Joan Casanelles-Abella, Marco Moretti, Pedro Pinho, Roeland Samson, Anskje Van Mensel, François Chiron, Florian Zellweger, et Martin K. Obrist. 2021. « Response of Bats and Nocturnal Insects to Urban Green Areas in Europe ». *Basic and Applied Ecology* 51 (mars): 59-70. <https://doi.org/10.1016/j.baae.2021.01.006>.

LINKS TO WEBSITES AND DOCUMENTS

Monitoring of crows in Tartu report: https://tartu.ee/sites/default/files/research_import/2018-01/Vareslaste%20monitooring%20Tartus_l%C3%B5pparuanne%2C%20leping%20M-030.pdf

Project Bioveins: <http://www.bioveins.eu/>

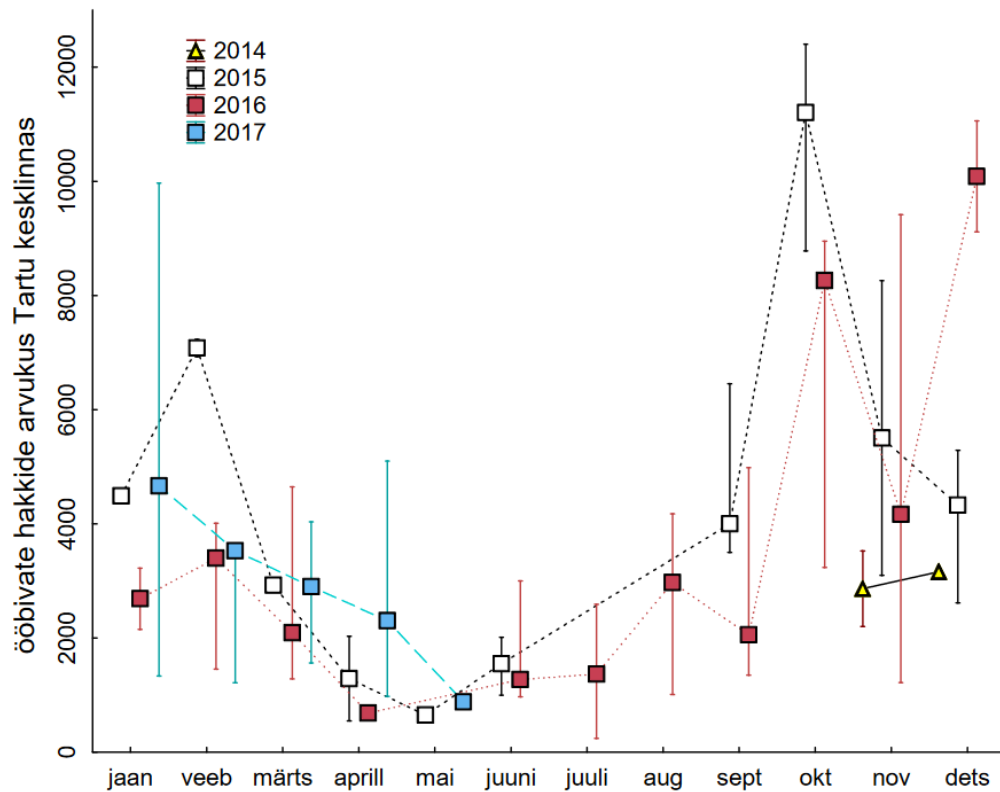
ACKNOWLEDGEMENTS

Veljo Runnel for introduction about Bioveins project.

Lauri Laanisto for introduction and contacts about Bioveins project, and for information about the different kinds of nuisances attributed to corvids in Tartu.

Marko Mägi for detailed explanations and documentation about monitoring of crows in Tartu.

DOCUMENTS



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Figure 1 - Measuring population density over months and years - Extract from the Monitoring Crows in Tartu report (see References), p. 5