# Investigation of traditional ecological knowledge of wild animal species in the Carpathian Basin

Summary of Ph.D. Thesis

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# **INTRODUCTION**

Traditional knowledge systems about the landscape and the biota have been fundamental for human development since the times of pre-modern and preindustrial societies in Europe. Humans living in close contact with the landscape as herdsmen and peasants have long possessed unified, systematic knowledge, including folk taxonomies, about phenomena that were of importance to them. The use and management of natural resources was based on centuries-old, often millennia-old ecological experience, on multi-generational knowledge passed down from generation to generation. According to Fikret Berkes, traditional ecological knowledge is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. In our work, we also focused on the study of traditional ecological knowledge within the meaning of Berkes' definition.

Ethnozoology is the scientific study of the dynamic relationships among people, and animals. Traditional ethnozoological knowledge has great cultural and economical importance. It is widely studied in the tropics and North America, but much less in Europe. Wild animal-based natural resources are often among the key resources local communities depend on. A major goal of these communities is to use and manage these resources sustainably. Long-term sustainability in the use and management of natural resources requires healthy ecosystems, while at the same time, sustainable management often contributes to maintaining the health of ecosystems.

The knowledge passed by local traditional communities, however, not only serves sustainable use and maintenance of the local community and its environment but may also provide valuable data, information and knowledge to science and conservation. Among the potential benefits of traditional ecological knowledge, it can help science to recognize new species, provide data on population sizes and dynamics of species that are difficult to observe, support the

monitoring of ecosystem health, incl. pasture conditions, and develop efficient conservation managament strategies and practices.

Research on ecological knowledge of people living in rural areas is receiving increased attention worldwide, and research on this field has also become more significant in Hungary in the last 10 years. Traditionally, ethnozoologists were primarily interested in basic research on the folk taxonomy of vertebrate species and more direct examination of some highly salient taxa which have direct relevance to people. In this thesis, in addition to the examination of these two topics, a more focused study of invertebrate-related knowledge and ecological/conservation issues were targeted.

## **OBJECTIVES**

Our research has the objective of presenting the folk knowledge of wild animals in Hungarian communities; examine the possibilities of knowledge coproduction between indigenous and local knowledge holders and the science; and study the local knowledge and perception of the European beaver's impact on local ecosystem services. The objectives in detail were:

1) make a list of folk taxa of invertebrates and wild mammal species,

2) describe folk biological classifications and nomenclatures of invertebrates and wild mammal species,

3) collect the salient features of invertebrates and wild mammal species,

4) collect the uses, related proverbs and sayings, and their conservation of invertebrates and wild mammal species,

5) examine the expert judgment of academic zoologists (with little or no expertise in traditional knowledge) and a feature-based linear model at predicting the observed level of local familiarity with wild animal species,

6) define the most useful morphological, ethological, ecological and cultural features for predicting the level of local familiarity with wild animal species,

7) describe the local knowledge about the Eurasian Beaver (e.g. protection status, reintroduction history, local distribution, feeding habits),

8) examine the local perception of negative or positive impacts of beavers on local provisioning, regulating and cultural ecosystem services, on nature and local livelihoods in general,

9) examine the local perceptions on the harmfulness and usefulness of beavers and its impacts on nature and the lives of locals.

## **MATERIAL AND METHODS**

## Study areas

We collected data among ethnic Hungarians practicing small-scale traditional agriculture in different landscapes: in the first research on mammals in north-western Romania; in the second on invertebrates in Romania (Sălaj), Slovakia (Gemer) and Croatia (Baranja). In these first two researches the choice of these regions were justified by the still existing traditional life-style, a varied natural environment, and the population size of inhabitants, which could ensure a larger number of knowledgeable informants.

The local knowledge obtained for the analysis examining predictions by zoologist and a feature-based linear model originated from the same three Romanian Slovakian and Croatian regions.

For the investigation of local people's perceptions on the Eurasian beaver three regions were chosen where beavers are present in waters close to settlements and where their activity affects the floodplains considerably. The study areas are in different types of watersheds (streams, small rivers and river branches of large rivers) and the local communities are in different socio-economic situations (traditionally farming and partially modernized). Studies were carried out in Romania (the Kászon Basin) and in Hungary (Szigetköz and in the Mura River valley).

### Data collection and analysis

Related to interviews about mammals and invertebrates, the objective was to identify and interview local people with the most extensive knowledge, that is why mainly snowball-metod was employed to find the most knowledgeable people. We studied invertebrate and mammal species (species groups) potentially occurring in the vicinity of the settlements. We used photos, held semi-structured interviews, and conducted picture sorting, during which they were asked to group species according to their own systems. We used these results to reconstruct the folk taxonomy. The indoor interviews were recorded on a dictaphone (approximately 88 hours of recording).

For the data collection for local people's perception of the Eurasian Beaver's impact on ecosystem services, structured interviews were conducted with 30 local people for three study sites. Half of the informants (altogether 45 people) were recommended by residents and local community leaders as 'inhabitants knowledgeable about beavers' (knowledgeable local interviewees – KLIs). The other half of the informants helped in representing the average population's knowledge and were chosen randomly, without any special recommendation.

Twelve scientific and conservation experts from Hungary and 6 from Romania were also interviewed in the same time period, using the same interview sheet, to improve our understanding about the local situations.

The impact of beavers on ecosystem services was analysed by extracting all information from the transcribed texts about each service mentioned by the informants. The beavers' negative and positive impacts on provisioning ecosystem services were analysed based on the number of respondents who mentioned certain categories. For regulating and cultural ecosystem services, the total number of informants mentioning them, and the mentioned memes (information units) were counted.

Overall perception of beavers' usefulness and harmfulness was elicited using multiple-choice questions and also free listing ones and a 3-grade scale. Both the overall perception of beavers' usefulness and harmfulness and the informants'

personal involvement were analysed by the number of respondents and the number of mentioned memes.

In the fourth study (in which we examined predictions by zoologist and a feature-based linear model on local knowledge) we determined the level of observed familiarity among local peoples. We counted the proportion of local knowledgeable informants who know the species at least moderately, i.e. can list at least 3 independent memes related to the species.

A linear model was constructed to quantify how particular features (morphological, ethological, etc.; i.e. explanatory variables) contribute to the level of observed familiarity (i.e. the dependent variable). Explanatory variables of the model were represented by 10 relevant features (traits and others). Each feature had 6 categories (from "no importance" to "great importance" for humans). Each category of each feature was included as a factor in further analyses. Parametrization was based on published literature data. Only elements of traditional knowledge that are part of an average biologist's or zoologist's knowledge (who are not experts in traditional knowledge) were taken into account during parametrization.

For variable selection (i.e. for separating the significant and the redundant variables), a forward stepwise procedure was used, based on the corrected Akaike's Information Criterion. Coefficients of the final linear model were calculated via model averaging. All the candidate models with significant explanatory power were included in the model averaging. The differences between the levels of estimated and observed familiarity were calculated for the 81 species selected for the zoologist prediction.

81 of the 166 taxa were selected by random stratified sampling for a questionnaire, ensuring that all the main taxonomic groups (mammals, reptiles, amphibians, molluscs, insects, and "other invertebrates") were represented. Three roughly equal groups contained species that were locally well known, moderately known and almost unknown.

We asked 20 zoologists from Hungary and Romania who are familiar with the studied areas (researchers working at universities, museums and research institutes,

zoology teachers, governmental and civil conservationists) to complete the questionnaire. Specialists in single species or small taxonomic groups (according to publication lists) were excluded. Of the 42 zoologists who qualified, 20 selected at random were asked to classify each species into four categories based on the level of familiarity they would expect from locals. For each species the average value of the 20 answers was calculated.

Spearman's rank correlation was applied in order to test the statistical dependence between a) the ranking of specific explanatory variables and the level of familiarity expected by zoologists and b) the ranking of specific explanatory variables and over- or underestimation of familiarity by zoologists.

Species were ranked according to the observed levels of familiarity based on traditional knowledge holders, and by the level of familiarity predicted by the zoologists. The differences between the two ranks were calculated.

### RESULTS

### The key findings of the dissertation

With the documentation of folk knowledge on wild mammals and invertebrates we provide a list of folk taxa, and discuss folk biological classification and nomenclature, salient features, uses, related proverbs, sayings, and conservation. The most important findings:

- 208 invertebrate and 42 mammal folk species were identified
- 859 invertebrate and 122 mammal folk name folk (and scientific) taxon identifications were made
- first description of the folk taxonomy of invertebrates and mammals in Hungarian (Central European) communities
- salient features of invertebrates and mammals were described for all known folk species
- 30 different uses of invertebrates were documented

We studied local knowledge of beavers and the perception of their impact on ecosystem services and local livelihoods, and the perception of their general harmfulness and usefulness in Hungary and Romania in three ecologically distinct, diverse rural landscapes. The most important findings:

- locals had a deep knowledge on beavers' behavior and impact
- the negatively most affected people were more constructive related to the conservation of beavers
- much more people had negative attitude towards beavers than those who were personally affected

We examined whether the expert judgment of academic zoologists or a featurebased linear model is better at predicting the observed level of local familiarity with wild animal species. The most important findings:

- similar accuracy of zoologists' and a feature-based linear model's estimates on local ethnozoological knowledge (ca. only 60%, and 70 %) was identified
- 50% overlap was identified between the species most inaccurately estimated by the zoologists and a feature-based linear model
- neither the overestimated nor the underestimated group of species was significantly different in their traits (tendencies - zoologists' accuracy decreased by undervaluation of local folklore and local usefulness and overvaluation of the importance of striking morphology; the model overemphasized morphology, size and abundance)

# CONCLUSIONS

Biologists may ask why one should study folk knowledge of animals in a region so often studied by zoologists for centuries. There are several answers to this question. The main goal of science is to describe the world. We argue, that before the dual impact of the market economy and public education became so powerful, Hungarian rural people might have possessed knowledge as deep as that of, for example, the natives of Amazonia. Ethnographic works from the late 19<sup>th</sup> and early 20<sup>th</sup> centuries provide the basis for this argument. In spite of this documentation of folk zoological knowledge in Europe is very limited. Although the names of the most important wild animals have been collected by ethnographers and linguists, folk zoological knowledge was not documented and published sufficiently due to the limits of theoretical and personal zoological knowledge and, also, due to the varying range of scientific interests.

Locals and conservationists often use different indicators to assess certain ecosystem services and they also view impacts on the local ecosystem services from different perspectives. Their understanding of biodiversity is also different. Communication with knowledgeable locals who are – as our results show – generally more receptive to regulating services could lead to satisfactory compromises and understanding in management. Local traditional ecological knowledge of wild animals is highly relevant to helping us understand the mentality and worldview of local people.

High level of uncertainty among zoologists in estimating local familiarity (30-40%) shows, that it may be unrealistic to expect academic zoologists with limited understanding of traditional zoological knowledge to identify adequate target species for knowledge co-production and thus bridge knowledge systems. It also raises ethical issues, for example, how correct it is to push scientists preparing assessments (e.g. in CBD or IPBES) to do reviews in areas they are not familiar with. It induces unfavorable bias in recognition given to different perspectives, and also imply the negative practice relying solely on external perspectives. This way both the local and external experts are treated unfairly which hinders the possibilities of the effective knowledge co-production.

Cooperative research based on more than one knowledge system can unite the benefits of different ontological and epistemological systems. Cooperative research can eliminate knowledge gaps, which can benefit all stakeholders who are actively involved in the process. We argue that bias and underestimation of local knowledge can hinder these processes, can lead to less efficient cooperation and

even waste resources, for example, if communication of conservationists is not adjusted well to the knowledge locals have of target species and species groups.

It is our sincere hope that traditional knowledge holders and their knowledge can thus more effectively promote the protection of species and habitats and the sustainable use of biodiversity, and increase awareness of the need for conservation. Inclusive conservation approaches can take into account not only the knowledge of locals but also local economic and socio-cultural aspects (e.g. perceptions based on local values and beliefs). Better recognition of local knowledge could also help the preservation and transmission of local knowledge necessary for the continuation of local – often still sustainable – land-use practices.

We argue that researchers of traditional and local knowledge can function as bridging experts in these activities, aiding zoologists and conservationists who seek target species for knowledge co-production. It is the scholars' responsibility to learn, archive and use the knowledge connected to animals, meanwhile, zoologists would have the opportunity to decolonize their approaches, open up to traditional knowledge, and learn how to work in collaboration with local people. We believe that a more efficient bridging of knowledge systems could increase the chances of success and lead to improved cooperation between conservation practice, academic science, and indigenous and traditional knowledge holders.

### LIST OF PUBLICATIONS

#### (MTMT identification number: 10048295)

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#### **Publications related to thesis**

#### Full papers (IF: 9.446)

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- <u>Ulicsni V.</u>, Babai D., Vadász Cs., Báldi A., Molnár Zs. Traditional ecological knowledge of wild animals: an underestimated opportunity for knowledge co-production for biodiversity assessments and conservation. 40th Annual Meeting of the Society of Ethnobiology, Montréal, Canada. 10-13. May, 2017. (oral presentation)
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- <u>Ulicsni V</u>. A gerinctelenekhez kapcsolódó hagyományos tudás és népi taxonómia a Kárpát-medencében. IX. Magyar Természetvédelmi Biológiai Konferencia: "Tudományoktól a döntéshozatalig" Szeged, Hungary. 20-23. November, 2014. (poster)
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- Juhász E., Biró M., <u>Ulicsni V</u>., Babai D., Molnár Zs. Magyarországi természetvédők és kutatók ismeretei az eurázsiai hóddal kapcsolatban. Hódkonferencia, Budapest, Hungary, 9. December, 2019. (oral presentation)
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