SCIENTIFIC REPORT – Stage 1 (2025): Global understanding of human–large carnivore systems (WP1) and preparation of local research activities for integrating large carnivores into General Urban Plans (PUG) (WP3)

Project director: Assoc. Prof. Dr. Tibor Hartel

Compared to the initial proposal, the project was contracted with a delay of approximately one year, so that year 2024 in the Gantt chart corresponds, in calendar terms, to year 2025. The activities planned for the first year have been completed and, in some respects, even exceeded, mainly because it was necessary to keep pace with recent theoretical developments in the field.

A key element for this first stage of the project was the publication, in 2025, of an article that proposes the concept of the "social-ecological niche", i.e. precisely the idea that SESCARNIVORE set out to develop. The full citation is: McInturff, A., Alagona, P. S., Cannon, C. E. B. and Pellow, D. N. 2025. The socio-ecological niche. *People and Nature* 7: 1185–1197. Once this theory appeared, we decided to invest additional effort in developing two review manuscripts in which we propose a theoretical framework that extends and matures the concept of the social-ecological niche, both in terms of theory and implementation potential. This effort was not explicitly foreseen in the initial planning, but was necessary to maintain the project and the team in an international leadership position in the field of human–wildlife coexistence. The theoretical framework we propose (detailed below) fully provides the innovative component of the SESCARNIVORE project.

Activity 1.1: Literature synthesis for a global understanding of large carnivores and people (first stage of Activity 1.1, WP1)

This activity aimed at producing a critical synthesis of the literature on human–large carnivore systems, necessary for developing the project's conceptual framework. In 2025, the literature synthesis was completed in full (100%). Based on it, three review manuscripts were prepared:

1. A first manuscript submitted to *Sustainability Science* (IF = 5.3, Q1), which integrates the literature on human–large carnivore coexistence and proposes a unified conceptual framework for assessing these systems.

2. A second manuscript, currently under review at *Conservation Letters* (IF = 5.9, Q1), focuses on the development and use of social-ecological indicators to evaluate network-type protected areas (Natura 2000).

3. A third manuscript is in the formatting stage for submission to a scientific journal.

All three manuscripts draw on the synthesis of more than 250 scientific articles.

Activity 1.2: Expert survey on large carnivores in Europe (first stage of Activity 1.2, WP1)

For Year 1, the planning foresaw the preparation of a pan-European expert survey, with the actual application scheduled for the following year. In 2025, the structure of the questionnaire was defined based on the conceptual framework presented in the manuscript mentioned above (Hartel et al., 2025, Figure 1) and internal team discussions. The sections, question types, response scales and main categories of target experts (researchers, practitioners, NGOs, protected area managers) were defined.

A pilot version was tested on a small number of key resource persons, and their feedback was incorporated into the revised version. The questionnaire will be fully ready for application in the period foreseen in the project. Scientific coordination is ensured by Dr. Norbert Petrovici (senior researcher) and Dr. Zoltán Mihály (postdoc), both members of the SESCARNIVORE team. The questionnaire will be finalized and translated into three languages during December 2025–January 2026.

Activity 1.3: Landscape assessment using remote sensing (Activity 3.1 in WP3)

This activity aims to assess landscape structure in the 15 study landscapes using remote sensing and GIS data. In 2025, the following were achieved:

- Identification and delineation of at least 15 landscapes as foreseen in the project, in line with the criteria set in the proposal (biogeographic regions, history of large carnivore presence, land-use types);

- Collection and organization of CORINE land cover data and digital elevation models into a unified GIS framework for the project;

- Testing of spatial analysis methods (classifications, landscape structure indicators, spatial models).

The results of these exercises have already materialized in an empirical manuscript on the dynamics of bear feeding and electric fencing in traditional landscapes, based on CORINE, DEM and spatial analyses (including logistic regression and Geographically Weighted Regression). This study is under review at *Ecology and Society* (Q1) and includes SESCARNIVORE collaborators with expertise in modelling and GIS.

Activity 1.4: Assessing landscape use by carnivores and people (first stage of Activity 3.2 in WP3)

This activity prepares the conceptual and logistical framework for assessing landscape use by large carnivores and humans, with a view to later integration into urban and spatial planning. In 2025, the following were carried out:

- Based on the theoretical synthesis and the manuscript submitted to *Sustainability Science*, a unified conceptual framework was developed for understanding landscape use by carnivores and people, which will guide the empirical analyses in WP3;

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- 50 camera traps were purchased to monitor bear and human activity in the selected landscapes, and their functioning was tested under field conditions;

- Three field visits were conducted in the area of the common land (composesorat) where the project will be implemented, to discuss the future placement of camera traps, access to land, types of human activities and brown bear presence; these visits helped build a relationship of trust with the land administrators;

- A pilot modelling exercise of brown bear use of wood-pastures was carried out, based on spatial and landscape structure data, serving as a proof of concept and demonstrating the feasibility of the project's proposed approach.

Activities related to Activities 1.1–1.4

In 2025, the basic infrastructure required for implementing WP1 and WP3 was secured. A total of **50 camera traps** were purchased, which will form the monitoring network for brown bear and human activity in the selected landscapes, as well as **7 laptops** for the research team members. In addition, the planned **software licences** (NVivo, Vensim) were purchased, necessary for qualitative studies and system-dynamics modelling.

Communication and visibility activities

In 2025, the official project website **SESCARNIVORE – Human–Large Carnivore Coexistence Research (sescarnivore.ro)** was launched and made fully operational. The platform presents the project's objectives and social-ecological approach, the team, the work-package structure, as well as news, photographs and information about field activities and workshops. The website is used as the main public communication tool and will be constantly updated throughout the project, contributing to national and international visibility and to maintaining links with communities and decision-makers.

The experience of PhD colleagues in the context of the EcoBear conference, together with photos, is presented on the project website.

The project director, T. Hartel, also had several media appearances on the topic of human–bear coexistence, including:

- *Europa Liberă*, August 2025

- *G4Media*, September 2025

Manuscripts submitted to journals

- **Hartel, T., Papp, C. R., Petrovici, N., Pascu, I. S., Maloș, C., Réti, K.-O., Ocrain, A., Varga, G., Sevianu, E., Măcicășan, V., Mihály, Z.,** Scheele, B. C. and **Rozylowicz, L**. 2025. A Wildlife–

Society–Environment framework for diagnosing human–wildlife conflict and coexistence in rural landscapes. *Sustainability Science*, under review.

Relevance for SESCARNIVORE: Provides the project's core theoretical framework, defining wildlife–society–environment interfaces and key indicators to diagnose conflict versus realised coexistence. Directly underpins WP1 (global synthesis and expert survey) and offers shared language and structure for interpreting systems-mapping workshops and case studies in WP2–WP3.

- **Hartel, T., Pascu, I. S., Maloş, C., Papp, C. R., Csákány, L.** and Wagener, F. 2025. Brown bear feeding and fencing dynamics in ancient wood-pastures: implications for coexistence in cultural landscapes. *Ecology and Society*, under review.

Relevance for SESCARNIVORE: Delivers the first detailed analysis of how feeding practices and fencing shape bear space use in ancient wood-pastures, a key model system for the project. Feeds into WP2 and WP3 by identifying concrete management and infrastructure leverage points for coexistence in rural and peri-urban landscapes.

- Plieninger, T., Jay, M. and **Hartel, T.** 2025. Future-proofing Natura 2000 through a biocultural approach. *Conservation Letters*, under review.

Relevance for SESCARNIVORE: Positions the project within European debates on biocultural conservation and Natura 2000, proposing community-centred, landscape-based social-ecological indicators and governance principles. Supports the development of social-ecological (including biocultural) indicators in WP1 and informs "bear-smart" governance and planning strategies in WP3.