Framework description template for research

General information

Institute: Institute of Nature Conservation -IOP PAN.

Research topic: Multiscale analyses of patterns and drivers of human–wildlife conflicts in the context of global environmental change: a worldwide systematic review.

Scientific discipline: Biological sciences – ecology.

Name of potential supervisor: Nuria Selva and Carlos Bautista.

Background information

In recent decades, human activity has become a major driver of biophysical changes on Earth, with unprecedented consequences for ecosystem functioning. Most research on global environmental change focuses on interactions among non-human species, overlooking the complex dynamics in landscapes heavily transformed by humans. Yet processes such as climate change, land-use alteration, and biodiversity loss strongly influence human–wildlife relationships, often increasing the frequency and severity of conflicts.

The project aims to provide a synthetic perspective on human–wildlife conflicts under global environmental change and analyze these interactions across multiple spatial scales. It will identify key determinants and ecological mechanisms driving conflicts and assess how anthropogenic processes shape their occurrence and intensity. The findings will enhance understanding of human–wildlife interactions in the Anthropocene and inform strategies for coexistence in a changing environment.

The research is conducted under the SONATA NCN project (No. 2024/55/D/NZ8/01512) titled “Human–wildlife conflicts under global environmental change”, led by Dr. Carlos Bautista at the Institute of Nature Conservation, Polish Academy of Sciences, ul. Mickiewicza 33, 31-120 Kraków, Poland.

The doctoral scholarship is funded as part of a research stipend within the project (approx. 5,000 PLN gross per month).

The main question to be addressed in the project

This project aims to synthesize research integrating the study of global environmental change with the occurrence of human-wildlife conflicts from an ecological perspective and at different spatial

scales. The project is focused on terrestrial vertebrates and consists of three main research questions:

1 - What constitutes human-wildlife conflict in the context of global change? Global-scale efforts to characterize conflict situations are rare. Most publications are descriptive and focused on one species and a particular location, restricting inference to the scale and characteristics of that system. There is a need to broaden the scope regarding what constitutes human-wildlife conflicts across taxa and regions.

2 - Are conflicts increasing over time due to global environmental impact? There is a general scientific consensus about a global increase in human-wildlife conflicts associated with increasing human impact on our planet. However, comprehensive assessments of that relationship and the trends in human-wildlife conflicts are missing at the global, regional, and landscape scales.

3 - In what ways is global change driving human-wildlife conflicts? Global change can shape human-wildlife conflicts in many ways, most of which are largely unexplored. Here, we will assess how climate change, land-system dynamics, altered biogeochemical flows, biodiversity loss, and other components of global change can influence existing conflicts or result in new ones.

Information on the methods

The PhD project will focus on multiscale analyses of human–wildlife conflicts through a global systematic literature review combined with advanced statistical modeling. The candidate will compile and synthesize data on negative interactions between humans and terrestrial vertebrates worldwide, including crop and livestock losses, damage to infrastructure, or attacks to humans. This will involve screening scientific and grey literature, extracting data on conflict type, taxa, geography, and ecosystem, as well as potential drivers of conflict such as human population density, land-use change, human footprint index, and climate variables.

In a first step, the candidate will classify conflicts and analyze their distribution across spatial and ecological gradients. Then, we will investigate temporal trends and fluctuations in the conflict data by identifying and organizing time-series data on conflict occurrence and intensity at multiple spatial resolutions (national to global). Statistical analyses will include piecewise structural equation models to explore relationships between categorical (e.g., taxa) and continuous variables (e.g., human pressure) and hierarchical Bayesian models (e.g., Integrated Nested Laplace Approximation - INLA) to account for spatiotemporal dependencies nested at multiple scales.

Finally, the project will assess ecological pathways through which components of global change influence conflicts, providing novel insights into the mechanisms driving human–wildlife interactions and their future dynamics under environmental change.

Additional information

We seek a highly motivated and creative person, with good communication skills, a strong capacity for work, and the ability to think independently. She/he will be part of an international research team. She/he will work closely with collaborators across several institutions. Therefore, a cooperative character, and a willingness to travel and conduct research stays abroad are highly desirable. The successful candidate is expected to publish results in scientific journals and disseminate them to scientific and non-scientific audiences. Professional experience abroad is an asset. All qualified applicants will receive consideration regardless of race, color, religion, sex, sexual orientation or identity, national origin or disability status.

In a nutshell, we seek a motivated student with:

- a Master's degree (or equivalent) in ecology, environmental science, geography, or a related field,
- familiarity with ecological literature and scientific databases,
- skills in R and/or other statistical software,
- basic GIS and spatial analysis skills,
- good written and oral communication in English,
- strong interest in ecological modelling and global environmental change.

Additionally, is desirable that the candidate will have:

- previous experience with systematic reviews or meta-analyses,
- experience with bibliographic databases (e.g., Web of Science, Scopus),
- international academic experience or collaboration,
- experience in scientific writing or prior publications.

Place/name of potential collaborators

Eloy Revilla from the Estación Biológica de Doñana -EBD CSIC-

References

Abrahms, B., Carter, N.H., Clark-Wolf, T.J., Gaynor, K.M., Johansson, E., McInturff, A., et al. (2023). Climate change as a global amplifier of human–wildlife conflict. Nat. Clim. Change, 13, 224–234.

Nyhus, P.J. (2016). Human–Wildlife Conflict and Coexistence. Annu. Rev. Environ. Resour., 41, 143–171.

Steffen, W., Crutzen, P.J. & McNeill, J.R. (2007). The Anthropocene: Are humans now overwhelming the great forces of nature? AMBIO J. Hum. Environ., 36, 614–621.