

The use of space and movement of animals is fundamental for their lives and without it, animals would not be able to survive. Animals move around in the environment in which they live to obtain food, find shelter and socialise through simple movements, such as standing, walking and running. The combination of these simple movements shapes the space they use. Animals can change how they use the space as they need to adapt to an environment which also changes. For example, if food is scarce, an animal will move more and will need more space. How much space an animal needs depends on many factors such as 'who he/she is' ('what individual and species'), 'what he/she eats', 'how much is he/she prone to move' and 'where he/she lives'. How important these factors are depends on whether we look at how much space it needs over the course of a day or a year or over its entire life. The spatial behaviour of animals is crucial for the ecosystem because, through their movement, other ecological processes are possible. For example, the seeds of fruits are dispersed by the movement of the animals that ingest them and later defecate the seeds in another place.

The animals' space use is complex, and scientists have been trying to understand it for years. Recently, some studies have reported that animals have altered the way they move and use space due to human activities or presence. Human pressure on the planet is increasing and animals have to cope with this. Some animals try to avoid humans, their activities and/or infrastructure, while others may try to benefit from them. All these can change 'what individual animals eat', 'how and how much they move' and 'where they live', and this may affect their survival and conservation.

The main objective of this study is to understand the space use of brown bears. The brown bear is particularly interesting to study because it is highly adaptive in its behaviour, lives in a wide range of environments, from Eurasia to North America, and from tundra to deserts, and feeds on a wide variety of plants and animals. The results of this project will allow us to draw conclusions that can be generalised and applied to the study of other animal species living in a wide range of environments, which are changing.

The project is divided into three parts. In the first part, we will focus on investigating how factors such as sex, food availability in the environment, habitat type, climate and global human pressure affect the spatial behaviour of bears among populations across their geographic range. To do so, we will review all available scientific literature on brown bear spatial use. In the second part, we will investigate the factors affecting daily and annual spatial use of bears in the Northern Carpathians. For that, we will use GPS movement data of collared individuals monitored for many years, mostly in Tatra and Bieszczady mountains in Poland. In the third part, we will investigate how the daily movement of individuals is influenced by individual characteristics, such as sex, food preferences and stress levels, as these ones dictate individuals' willingness and need to move. We will also look at how these movements change according to habitat quality, such as levels of human disturbance.

The proposed project will provide new insights into the spatiotemporal relationships of biological and ecological drivers and animal space use. This research will help to better understand the movement strategies underlying individual space use patterns. The project will also make an important contribution to the ecological knowledge about brown bear's use of space in the Carpathian population, the largest, but one of the less studied in continental Europe.