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Editorial

Conservation and Ecology of Raptors: Introduction to the Special Issue

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Raptors are a diverse avian guild distributed worldwide and adapted to different environments. They have attracted a strong interest from scientists because of their conservation status and ecology. Raptors provide critical ecosystem services based on their role in natural food chains. They have evolved ecologically to specialize and adapt to different habitats and food resources. Thus, they are subject to a wide range of biological, ecological, and evolutionary studies. At present, this guild of birds faces a high risk of extinction due to numerous threats that occur in their breeding, migration, and wintering areas. Globally, 18% of raptors are threatened with extinction and 52% have declining populations. They stand at the top of the trophic pyramids and are normally distributed at low densities over vast areas. Some species are long-distance migrants while others are resident. Birds of prey play a crucial role in the conservation of ecosystems and are assumed as flagship species in relation to other taxa. Understanding and studying their demography, abundance, diet, resource selection, movements, ecological requirements, adaptive capacity, and the threats they face, will provide valuable information about the current ecosystem functioning and status.

The importance of raptors is even more pronounced, since by protecting them and their habitats, we are actually preserving a variety of other invertebrate and vertebrate species. At a global scale, many raptors are considered umbrella species of particular importance in conservation. By studying their intra- and inter-specific interactions, we can learn more about their diet, competition, and movement ecology, as well as the diversity of environments they inhabit. These environments, on other hand, harbor diverse communities of prey species, which are utilized by raptors. However, raptors' behavior may differ between different age classes and is very often determined by sex depending on the species. Since raptor population trends are mostly driven by the given species' demography, turnover, breeding rates, and human-induced mortality, studying these aspects of their ecology is fundamental to the conservation interventions to be conducted.

The twelve papers in this Special Issue address all these topics.

Four papers contribute to understanding prey composition and adaptations to different food sources as well as the related spatial and temporal limitations [1–4]. These studies were conducted in different regions of Europe—two in Bulgaria [1,2], one in Poland [5], and one in Spain [3]. The two studies from Bulgaria were based on a large apex predator—the eastern imperial eagle, and they have revealed the unknown and understudied features of the species' foraging behavior and diet variations. In the study from Poland, the authors aimed to compare the diet of the white-tailed eagle in optimal and suboptimal conditions to investigate how population development affects prey composition there. The study suggested that eagles cope with a lack of optimal prey by ranging farther and exploring non-optimal foraging habitats. The last study of this group investigated the patterns of use of household waste by overwintering red kites in southeastern Madrid, central Spain. The

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results reveal the constant presence of relatively low numbers of kites during the whole winter period in the studied landfill. The Special Issue continues with an overview of nest site selection in three apex predators, which are positioned at the highest trophic level of the food web, being the best indicators of the ecosystem's richness and functioning [4,6]. In the first study [4], species distribution modelling was applied to study the association of the golden eagle and Bonelli's eagle to different natural and anthropogenic factors to distinguish both species' niche separation and coexistence. The other study conducted a multi-scale model analysis of eagle owl territories in Israel to understand the habitat requirements of the species. Interestingly, the authors found that the species' distribution was limited by the availability of quality nest locations, i.e., quarries and caves.

Some of the most important traits in raptor breeding cycles and territory occupancy are the turnover rates, dispersal, and prey species richness. Four of the Special Issue papers give an overview of the pertinent aspects of this topic [7–10] and reveal important findings concerning territory occupancy. A study from Finland [7] used genetic sampling to understand the genetic diversity and population structure of the golden eagle. The authors examined the turnover rate using chick genotypes and revealed that the turnover rate of this population was 23%. Another study from Scotland [8] sought to find and analyze pre-settlement data from 37 GPS-tagged nestling golden eagles, later recorded as having settled in their first territory. The third of this set of studies analyzed home range size and space use in territorial Bonelli's eagles in Spain [9]. Authors found that the home range size of females was slightly smaller than that of males, due to the decreased activity during the breeding season as a result of egg laying, incubation, and nest attendance. The last study of this series [10] investigated the activity patterns of goshawks and their role as an indicator of bird abundance. One of the studies [11] in this Special Issue aimed to determine how changes (caused by external agents or by endogenous modifications) to the species interacting with the lesser kestrel could induce changes (both positive and negative) to its population stock. The authors used a qualitative modelling approach to identify the species (predators, competitors, prey) that interacted with the species of interest (the lesser kestrel) in southern Italy, mapped all of the ecological interactions among these species, and simulated different management strategies that could increase kestrel population stock by targeting the species that interacted with it. Finally, the last of the studies dealt with pure ecological research, investigating whether road kills were density-dependent [12]. The study proved that barn owl road kills were density-dependent and demonstrated the importance of monitoring breeding and population numbers in roadkill studies.

The papers in this Special Issue address many of the most essential questions related to the biology, ecology, and conservation of raptors. Cumulatively, the papers in this Special Issue provide important answers to many of these questions and establish a foundation for further research on these topics.

Conflicts of Interest: The authors declare no conflict of interest.

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