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Research Article/Araştırma Makalesi

The Threat Analysis and Conservation Needs of Wild Mammals Distributing Around Van Province, Eastern Anatolian of Türkiye

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Abstract: During the field and monitoring studies carried out in 352 different localities between 2013 and 2014, a total of 25 species were recorded by direct and indirect observation techniques in Van province in the East Anatolian Türkiye. Of these, following one species (*Oryctolagus cuniculus)* is endangered, two species (*Capra aegagrus* and *Ursus arctos*) are vulnerable, two species (*Spermophilus xanthoprymnus* and *Lutra lutra*) are near threatened and others are least concern category according to IUCN. As a result of the findings, it was determined that rodents and carnivores have the highest rate of species in the study area and special efforts should be spent to protect important mammals in the priority areas, especially in Saray-Keçikayası, Çatak-Sak, Çatak-Dalbastı, and Gürpınar-Çepkenli villages. This dataset provides reliable records that contribute to increasing knowledge on the distribution of mammal species in Van.

Keywords: Mammalia, biodiversity, observation, contribution, IUCN.

Türkiye'nin Doğu Anadolu Bölgesi Van İli Civarında Yayılış Gösteren Yaban Memelilerine Ait Tehdit Analizleri ve Koruma İhtiyaçları

Öz: 2013-2014 yılları arasında üç yüz elli iki (352) farklı lokalitede gerçekleştirilen saha ve izleme çalışmaları ile Türkiye'nin Doğu Anadolu Bölgesi'ndeki Van ilinden doğrudan ve dolaylı gözlem teknikleri kullanılarak toplam yirmi beş (25) tür tespit edilmiştir. IUCN'nin kırmızı liste ölçütlerine göre bunlardan bir tür (*Oryctolagus cuniculus*) tehlikede, iki tür (*Capra aegagrus* ve *Ursus arctos*) duyarlı ve iki tür (*Spermophilus xanthoprymnus* ve *Lutra lutra*) ise tehdide açık durumdayken diğerleri düşük risk kategorisindedir. Elde edilen bulgular sonucunda, kemirgen ve karnivorların çalışma alanında en yüksek tür oranına sahip oldukları görülmüş ve özellikle Saray-Keçikayası, Çatak-Sak, Çatak-Dalbastı ve Gürpınar-Çepkenli köyleri gibi öncelikli alanlarda önemli memelilerin korunmasına yönelik özel çaba gösterilmesi gereği görülmüştür. Bu veriler Van'da dağılış gösteren memeliler hakkında ki mevcut bilgilere önemli katkılar sağlayacaktır.

Anahtar kelimeler: Memeliler, biyoçeşitlilik, gözlem, katkı, IUCN.

1. Introduction

Türkiye, due to its role as a bridge, provides a natural pathway for the spread of species between Asia and Europe. Being located on the transition point between the continents of Europe, Asia, and Africa; surrounded by different seas on three sides; and having different altitudes caused it to have three phytogeographical regions (Mediterranean, Irano-Turanian, and Euro-Siberian) and many different climatic conditions (Davis, 1971; Davis et al., 1988; Demirsoy, 1999; Çıplak, 2003). Türkiye's climate diversity makes it one of the most important countries in its geographical area in terms of biodiversity. In fact, while Europe hosts around 200 mammal species, 170 mammal species are distributed in Türkiye (Demirsoy, 1996; Wilson & Reeder, 2005; Eken et al., 2006; Yiğit et al., 2006a; Özkazanç, 2012). Three of the seven gates (Erzurum-Kars, Iğdır-Aralık, and Van-Hakkari plateaus) that animals spread to Anatolia are located in Eastern Anatolia (Demirsoy, 1996). Due to its location, the province of Van encompasses a great diversity of habitats and species that are ecologically, economically, and scientifically important as it is on the routes of these gates. Unfortunately, there is not enough information about the wild mammals in order to maintain the biodiversity and conservation of these species and their habitats in Türkiye. In the previous studies on mammals a total of 19 mammal species, *Spermophilus xanthoprymnus*, *Mus musculus*, *Mesocricetus brandti*, *Cricetulus migratorius*, *Allactaga williamsi*, *Ellobius lutescens*, *Nannospalax xanthodon*, *Apodemus sylvaticus*, *Microtus schidlovskii*, *Pipistrellus pipistrellus*, *Meriones tristrami*, *Sciurus anomalus*, *Vulpes vulpes*, *Erinaceus concolor*, *Lepus europaeus*, *Felis silvestris*, *Martes foina*, *Meles meles*, and *Lutra lutra* were recorded from Van and its vicinity based on the exemplified species (Albayrak, 1987; Alp, 1999; Yiğit & Çolak, 1998a,b; Coşkun & Ulutürk, 2001, 2003; Yiğit et al., 2006a,b; Coşkun et al., 2012; Toyran et al., 2018). Apart from these, it is stated that some wild mammals may also be distributed in this region due to their distribution in the nearby regions. Many species face a high risk of extinction in the near future, parallel to habitat loss as a result of human activities. A key aim of this study is to provide a mammal inventory for the province of Van based on the data obtained from the field study and to determine the habitat selection and threat analysis of these species. Thus, further research of the mammalian species identified in the area and determining the priority regions will contribute to conserve the important habitats and biodiversity of the area before anthropogenic activity.

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2. Material and Methods

The province of Van, with the largest lake of Türkiye, is entirely within the Van Lake basin and located in the Eastern Anatolia (Fig. 1). The continental climate is prevailing in the region with long and harsh winters as almost half of the year (150 days) is below 0ºC. Annual precipitation varies between 370 and 570 mm depending on the districts. 33% of the total area of Van consists of plateaus and highlands. While the surroundings of Lake Van and the valleys in the province are covered with rich vegetation, the mountains are generally bare without trees. The lands of the province present a steppe landscape. 70% of the provincial lands are covered with meadows and pastures, 23% are cultivated and planted areas, and 2% are covered with forests and heaths.

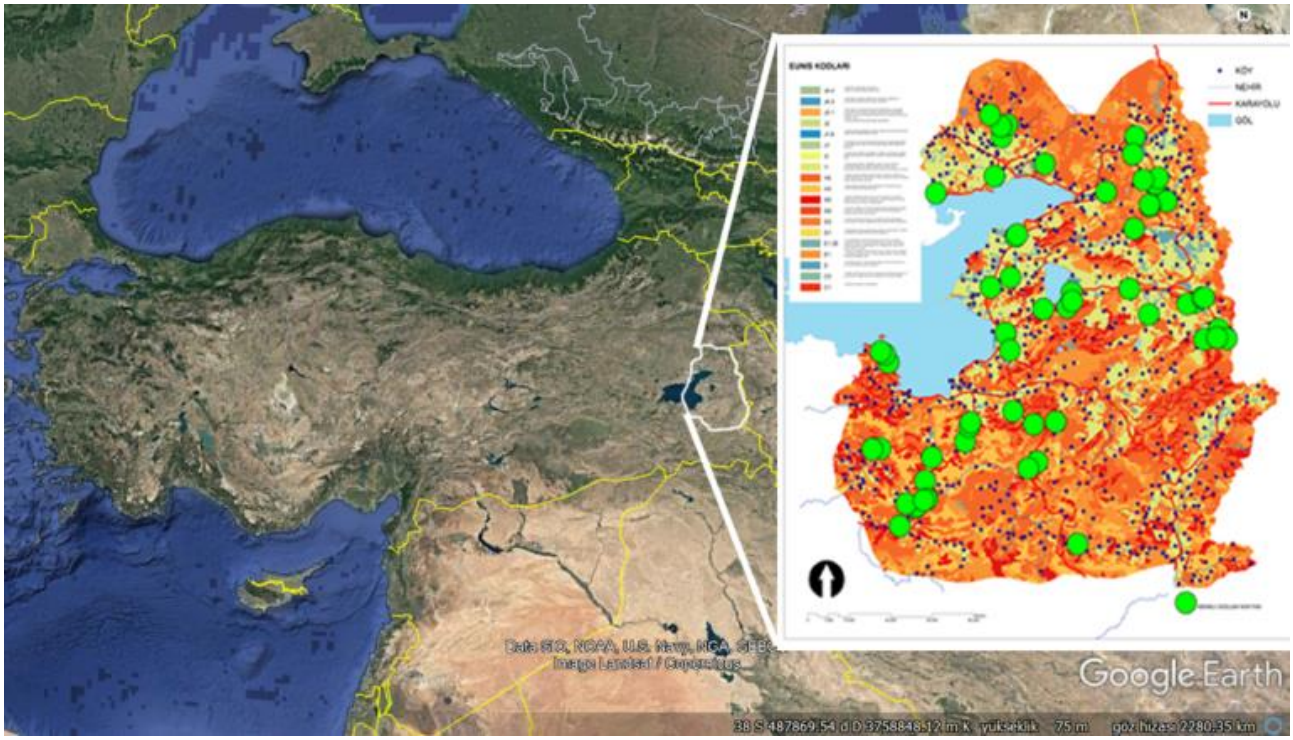

Figure 1. Ecosystem and distribution of the mammal observation points.

Comprehensive studies on mammals were carried out between 2013 and 2014 in the province of Van, Eastern Anatolian region of Türkiye, focusing on the 352 different localities (Fig. 1). Mammalian species were observed by direct (binoculars, video cam, and DSLR camera) and indirect observation (footprints, feces, peeling of tree barks, food remains, scratching places, owl pellets, and etc.) methods. Checklists and reference books were used to identify species (Corbet, 1978; Niethammer & Krapp, 1978; Harrison & Bates, 1991; Kefelioğlu, 1995; Kryštufek & Vohralík, 2001; Wilson & Reeder, 2005). In order to monitor the wild mammals, observation localities and times were selected by determining the daily activities (roaming, overnight, feeding, and etc.) of species by preliminary field studies. In addition to the field studies, we compiled the previously published papers and evaluated the data from the interviews done with the local people, hunters, and Nature Conservation and National Parks (NCNP, Turkish abbreviation DKMP) personnel to take into account all kinds of factors that may affect the distribution of wild mammals because of direct or indirect observations.

3. Results

The field studies carried out in 352 different localities between 2013 and 2014 allowed us to identify 25 mammal species, by direct and indirect observation techniques, from Van belonging to 6 orders and 15 families (Table 1). The highest species rate in the study area was found to be

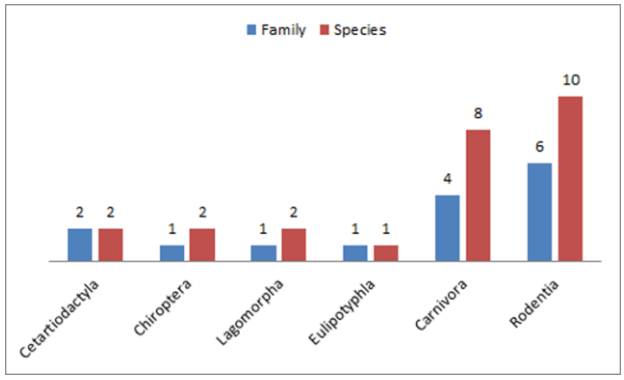

Figure 2. Family and species ratios of orders in the mammal fauna of Van

rodents with 10 species belonging to 6 families (Fig. 2). The majority of the species identified in the study area were directly observed and their presence in the area was supported by photographs (Fig. 3). While brown bear and wolf cannot be photographed, many footprints of these species were found in the study area (Fig. 4). Again, *Mus musculus* and *M. socialis* species, which are difficult to be observed in the area, were determined from the skeletal remains obtained from the pellets of owl species in the area (Fig. 4). Only 14 of these 25 species, *Nannospalax xanthodon*, *Ellobius lutescens*, *Cricetulus migratorius*, *Allactaga williamsi*, *Lepus europaeus*, *Sciurus anomalus*, *Spermophilus xanthoprymnus*, *Vulpes vulpes*, *Felis silvestris*, *Erinaceus concolor*, *Pipistrellus pipistrellus*, *Mus musculus*, *Meles meles*,

and *Lutra lutra*, were previously known to the study area based on the samples. The remaining 11 species, *Martes martes*, *Mustela nivalis*, *Canis lupus*, *Hystrix indica*, *Ursus arctos*, *Sus scrofa*, *Capra aegagrus*, *Oryctolagus cuniculus*, *Myotis myotis*, *Microtus socialis*, and *Meriones persicus*, were identified as the first exemplified records for the study area. In addition, it has been stated by the citizens and authorities that Kuzu and Akdamar Islands are not the natural habitats of the *O. cuniculus* that is distributed here and that it was brought here by humans.

Figure 3. Wild mammals detected in Van province by direct observation (Photographed by Dr. Servet ULUTÜRK)

Table1. Wild mammals of Van and their conservation status (E, endangered; Vu, vulnerable; NT, near-threatened; Lc, least concern; DD, data deficient).

Order	Family	Common name	Scientific name	IUCN	CITES	BERN
Cetartiodactyla	Bovidae	Wild Goat	*Capra aegagrus* Erxleben, 1777	VU		II
	Suidae	Wild Boar	*Sus scrofa* Linnaeus 1758	LC		
Chiroptera	Vespertilionidae	Greater Mouse-eared Bat	*Myotis myotis* (Borkhausen 1797)	LC	II	
		Common Pipistrelle	*Pipistrellus pipistrellus* (Schreber 1774)	LC	III	
Logomorpha	Leporidae	European Hare	*Lepus europaeus* Linnaeus 1758	LC		III
		European rabbit	*Oryctolagus cuniculus* (Linnaeus 1758)	EN		
Eulipotyphla	Erinaceidae	White-breasted Hedgehog	*Erinaceus concolor* Martin1837	LC		
Carnivora	Ursidae	Brown Bear	*Ursus arctos* Linnaeus 1758	VU		

Table1. (Continued)

Order	Family	Common name	*Scientific name*	IUCN	CITES	BERN
Carnivora	Felidae	Wild Cat	*Felis silvestris* Schreber 1777	LC		
	Canidae	Grey Wolf	*Canis lupus* Linnaeus 1758	LC	I	II
		Red Fox	*Vulpes vulpes* Linnaeus 1758	LC		
	Mustelidae	Common Otter	*Lutra lutra* Linnaeus 1758	NT	I/w	II
		Pine Marten	*Martes martes* Linnaeus 1758	LC	III	
		Eurasian Badger	*Meles meles* (Linnaeus 1758)	LC		
		Leasty Weasel	*Mustela nivalis* Linnaeus 1766	LC	III	
Rodentia	Hystricidae	Indian Crested Porcupine	*Hystrix indica* (Kerr 1792)	LC		II
	Muridae	Persian Jird	*Meriones persicus* (Blanford 1875)	LC		
		House Mouse	*Mus musculus* Linnaeus 1758	LC		
	Sciuridae	Caucasian Squirrel	*Sciurus anomalus* Gmelin 1778	LC	II	
		Anatolian Ground Squirrel	*Spermophilus xanthoprymnus* Bennett 1835	NT		
	Spalacidae	Nehring's Blind Mole Rat	*Nannospalax xanthadon* (Satunin1898)	DD		
	Cricetidae	Grey Dwarf Hamster	*Cricetulus migratorius* (Pallas 1773)	LC		
		Transcaucasian Mole Vole	*Ellobius lutescens* Thomas 1897	LC		
		Social Vole	*Microtus socialis* (Pallas, 1773)	LC		
	Dipodidae	William's Jerboa	*Allactaga williamsi* Thomas 1897	LC		

Microtus socialis skulls from owl pellets

Mus musculus skulls from owl pellets

Footprints of *Ursus arctos*

Footprints of *Canis lupus*

Figure 4. Wild mammals detected in Van province by indirect observation (Photographed by Dr. Servet ULUTÜRK)

4. Discussion

Detection of 11 more mammal species, different from what was previously defined, increased the number of the exemplified species in the area to 30. However, 5 species from the previously exemplified studies (*Mesocricetus brandti*, *Apodemus sylvaticus*, *Microtus schidlovskii*, *Meriones tristrami* and *Martes foina)* and 17 species included in the literature data (*Lynx lynx*, *Rattus rattus*, *R. norvegicus*, *Arvicola terrestris*, *Crocidura leucodon*, *Microtus arvalis*, *Mustela nivalis*, *Dryomys nitedula*, *Apodemus mystacinus*, *A. flavicollis*, *Mustela erminea*, *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis aurascens*, *M. blythii*, *M. nipalensis*, *Hypsugo savii*) were not encountered in this study. Most of these undetected species were given in previous studies, taking into account their close distribution areas (Demirsoy, 1996; Kryštufek & Vohralík, 2001; Kuru, 1994; Wilson & Reeder, 2005; Yiğit et al., 2006b). It was seen that rodents and carnivores had the highest number of species in Van province (Fig. 2). Of exemplified species, following one species (*Oryctolagus cuniculus)* which was found only on Kuzu and Akdamar islands is endangered, two species (*Capra aegagrus* and *Ursus arctos*) are vulnerable, two species (*Spermophilus xanthoprymnus* and *Lutra lutra*) are near threatened, and others are least concern category according to International Union for Conservation of Nature (IUCN). However, although in the minimum concern category on a global scale, bat species *Myotis myotis* and *Pipistrellus pipistrellus* are under threat on a national scale along with *Hystrix indica* and *Canis lupus* species in the study area. Similarly, according to CITES, *C. lupus* and *L. lutra* are in Appx -1, *Sciurus anomalus* and *Myotis myotis* are in Appx -2, and *Vulpes vulpes*, *Martes martes* and *P. pipistrellus* are in Appx -3 list. The conservation status of the species in terms of IUCN, BERN, and CITES were given in Table 1. The *O. cuniculus* species, which is distributed only on Akdamar and Kuzu Islands in the area, is actually descended from a few pairs of domesticated individuals brought here by humans. These pets, which were left on the island by some local administrators with the idea of beautifying the island and increasing its biological richness, have become wild over the years, away from the pressure of the predators and the threats posed by human beings. Over a decade, these two islands have functioned as a wildlife reservation area and have provided an important habitat for this species, which is not found in almost anywhere in Anatolia. Due to the damage it has caused to the vegetation on the islands due to its highly increasing population, the individuals caught alive by the teams of NCNP provincial directorate are released into the nature outside of these islands. For such a species where we can see the 10th generation on average in a year, we can say that this geographical isolation may be a triggering factor in the evolution of this species. In this sense, detailed comparison studies of this island's population with its natural population will be of interest for the mammalian biologists. Human activities are the primary causes of biodiversity loss and emerge as the biggest threat. Morerover the climate change, which is also caused by the human factor, poses a threat to the acceleration of habitat and species losses. The primary goal in "Aichi Biodiversity Targets" plans to address these concerns is to protect 17% of the global land surface, focusing on the areas of particular importance for the biodiversity and ecosystem services (Fernanda et al., 2017). Approximately 3% of the total surface area in Türkiye is in the status of protected area (Thomas, 2006). However, this ratio should be increased by identifying priority areas based on the richness, endemism, and vulnerability of the species. Considering the distribution and densities of the species identified in this study, Saray-Keçikayası, Çatak-Sak, Çatak-Dalbastı, and Gürpınar-Çepkenli villages which are surrounded by high steep cliffs and forested areas can be determined as priority regions for the conservation of mammals. Unfortunately, in this region, as in the rest of the world, the human factor emerges as the biggest threat to biodiversity. Especially in winter, some mammals such as foxes, wolves, brown bears, and martens, which approach the settlements in order to find food, are killed by the local people. In the same way, while the fish farms established in the area interrupt the habitats of the otters, they are killed by the farm owners to protect the fish. The project area has a great diversity in terms of wild mammals. This richness is currently threatened, mostly by human activities including habitat loss and harvesting. We must protect this biodiversity by improving the population densities of species and we must be able to benefit from this natural resource in a sustainable way. Thus, the sustainable use of biodiversity can be protected. Also high priority areas, combined with areas of high priority for other taxonomic groups and with social, economic, and political considerations, provide a biological foundation for the future conservation planning efforts. In addition, determining and comparing the priority areas for the conservation of mammals on the basis of biological diversity will make an important contribution to the literature.

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